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CHAMBERS'S  
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# CHAMBERS'S

## NEW

# AMERICAN *ENCYCLOPÆDIA*.

**MERINO**, an important breed of sheep, originally Spanish, but now widely diffused throughout Europe, and constituting a great part of the wealth of Australia. The *M.* has large limbs, and the male has large spiral horns, which do not rise above the head; the skin of the neck is loose and pendulous; the cheeks and forehead bear wool; the fleece is fine, long, soft, and twisted in silky spiral ringlets, abounding in oil, which attracts dust, so that it has generally a dingy appearance. The fleece is sometimes black, and black spots are apt to appear even in the most carefully bred flocks. The *M.* sheep fattens slowly, and owes its value altogether to the excellence of its wool. It has not been found profitable in Britain, where the production of mutton is a great part of the object of the sheep-farmer.

**MERINO.** See **WOOLEN MANUFACTURE**.

**MERIONETH**, a county of Wales, is bounded on the w. by Cardigan Bay, and on the n. by the counties of Caernarvon and Denbigh. Area, 835,291 acres; pop. (1871) 44,593. The coast immediately south of the town of Harlech rises into cliffs, is skirted by sands, and fringed by three dangerous sandbanks at some distance out to sea. *M.* is the most mountainous county in Wales, although its peaks do not rise to the height of some of those in Caernarvonshire. The chain comprising the highest peaks runs from north-west to south-east, and its summits are Arran Mowdddy (2665 feet) and Cader Idris (q. v.). The county is watered by the Dee, which flows north-east, and by the Mawddach and the Dovey, which reach the sea after a south-west course. The soil of *M.* is generally poor, and large tracts are unfit for profitable cultivation. Of the total acreage, only 151,291 acres were under crop in 1876; and of this portion 113,698 acres were in permanent pasture. There were 376,968 sheep in the county. Slate and limestone are largely quarried; a little lead and copper is mined; and of late gold has been found in Merioneth. In 1866, there were obtained at Castell Carnodochan 529 oz. of gold, and at Vigra and Clogau, 214 oz. Woollens and flannels are manufactured. Chief town, Dolgelley (q. v.).

**MERIVALE**, John Herman, an English scholar and translator, was born at Exeter in 1779, studied at St John's College, Cambridge, and was called to the bar in 1805. He contributed largely to Bland's "Collections from the Greek Anthology," published in 1813, and brought out a second edition himself in 1833. From 1831 to his death in 1844, he held the office of Commissioner of Bankruptcy. Among his other literary performances may be mentioned "Poems Original and Translated" (1841), and "Minor Poems of Schiller" (1844).—*M.*, the **REV CHARLES**, son of the preceding, was born in 1809, studied at St John's College, Cambridge, where he took his degree in 1830, and was successively scholar, fellow, and tutor. He has acquired a great reputation as an author by his "Fall of the Roman Republic" (1853), "History of the Romans under the Empire," 8 vols. (1859-65), and Boyle Lectures (1864-65), &c. *M.* was installed Dean of Ely in 1869.—Another son, **HERMAN**, born in 1805, was appointed Professor of Political Economy at Oxford in 1837, and permanent Under Secretary of State for India in 1859. In the same year he was made C.B. He also wrote on colonization. He died on February 8, 1874.

**MERLE D'AUBIGNE**, Jean Henri, a popular ecclesiastical historian, was born at Eaux-Vives, near Geneva in Switzerland, 16th August 1794, studied there and at Berlin—under Neander—and subsequently became pastor of the French Protestant Church in Hamburg. Thence, after a residence of five years, he proceeded to Brussels, became chaplain of King William, who, after the revolution of 1830, invited him



Merlin  
Merseburg

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to Holland, as tutor to the Prince of Orange. M., however, declined the offer, and returning to Geneva, took part in the institution of a new college for the propagation of orthodox theology, in which he was appointed Professor of Church History. With the exception of some visits to England and Scotland, where he had numerous readers and admirers, he remained constantly at Geneva. The work which has given him so widespread a reputation is his "*Histoire de la Réformation au seizième Siècle*" (1835, et seq.). It is written with the utmost vivacity, and is sometimes eloquent. Its popularity has been immense. Among M. D.'s other writings are—"Le Luthéranisme et la Réforme" (Par. 1844); "Germany, England, and Scotland" (1848); "Le Protecteur, ou la République d'Angleterre aux Jours de Cromwell" (1848); "Trois Siècles de Lutte en Ecosse" (1850); "Caractère du Réformateur et de la Réformation de Genève," and "Histoire de la Réformation en Europe au Temps de Calvin" (1862—1877). He died at Geneva, 20th October 1872.

**MERLIN** (*Falco cæalon* or *Hypotriorchis cæalon*), the smallest of the British *Falconidae*, scarcely exceeding a black-bird in size, but very bold and powerful, and possessing all the characters of the true falcon, with the distinction of large hexagonal scales on the front of the tarsal. It is of a bluish ash color above; reddish yellow on the breast and belly, with longitudinal dark spots, the throat of the adult male white. The wings reach to two-thirds of the length of the tail. It builds its nest on the ground, and is fond of localities where large stones are plentiful, on which it is often to be seen perched, and is therefore often called the *Stone Falcon*. It is common in most parts of Europe, is found in Asia and North America, and extends southwards in Africa, even to the Cape of Good Hope. It was of great repute in the days of falconry, being very easily trained, and flying readily at its quarry. It was therefore often used for taking partridges and wood-pigeons. It is a very lively bird, and often utters a harsh scream. It usually flies low and very rapidly, threading its way, if necessary, through branches and leaves, but it will also follow its prey in mounting upwards to a great height.

**MERLIN**, the name of an ancient Welsh prophet and enchanter, who is believed to have flourished during the decline of the native British power in its contest with the Saxon invaders. Both the Cambrian and the Strathclyde Britons boasted of a M. who was, in all probability, the same personage decked out in different legendary guise.—The Cambrian M., called *M. Emrys* or *Ambrosius*, is said by Geoffrey of Monmouth, in his "*Historia Brittonum*," to have lived in the 5th c., to have sprung from the intercourse of a demon with a Welsh princess, and to have displayed the possession of miraculous powers from infancy. He is alleged to have been the adviser of King Vortigern, and subsequently of Ambrosius, Uterpendragon and the great King Arthur. He is often alluded to by our older poets, especially Spenser, in his "*Fairy Queen*," and also figures in Tennyson's "*Idylls of the King*." He has been made the subject of a metrical romance, of which there is a manuscript copy in the Advocates' Library in Edinburgh. (For an analysis of this romance, see Ellis's "*Specimens of Early English Metrical Romances*.") A collection of prophecies attributed to him appeared in French (Paris, 1496), in English (Lond. 1529 and 1533), and in Latin (Venice, 1554); and their existence is traceable as least as far back as the time of the poet Lawrence (*circa* 1860).—The Strathclyde, or—if we may be allowed an expression which anticipates history—the *Scottish M.*, called *Merlin*, the *Wyllt*, or *Merlin Caledonius*, is placed in the 6th c., and appears as a contemporary of St Kentigern, Bishop of Glasgow. His grave is still shown at Drummelzier, on the Tweed, where, in attempting to escape across the river from a band of hostile rustics, he was impaled on a hidden stake. A metrical life of him, extending to more than 1500 lines, professedly based on Armorican materials, and incorrectly ascribed to Geoffrey of Monmouth, was published by the Roxburghe Club in 1830. His prophecies—published at Edinburgh in 1615—contain those ascribed to the Welsh Merlin.

**MERLON**, in Fortification, is the portion of the parapet between two embrasures. Its length is usually from 15 to 18 feet.

**MERMAID** (i. e., sea-maid), an imaginary inhabitant of the sea. The upper parts of mermaids are represented as resembling those of a human being, generally of a female—although the *Merman* is also sometimes heard of—whilst the body ter-

minates in a tail like that of a fish. There is an evident affinity between the stories concerning mermaids and those concerning the sirens and tritons, perhaps also the nereids, of the ancients. The probability is that these stories have originated in the appearance of seals, walruses, and perhaps still more of the herbivorous cetacea, in regions where they are rare, or to persons unaccustomed to see them. "Large allowance must be made for the workings of an excited imagination, in situations of solitude and apprehension, on the unexpected appearance of an extraordinary and unknown object." Many of the stories concerning mermaids belong to the northern parts of the world, where the herbivorous cetacea are of rare occurrence, and perhaps some of the solitary seals have often given occasion to them. But the herbivorous cetaceans do occasionally wander into the British, and probably even into more northern seas. Sir James Emerson Tennent says concerning the Dugong (q. v.): "The rude approach to the human outline, observed in the shape of the head of this creature, and the attitude of the mother while suckling her young, holding it to her breast with one flipper, while swimming with the other, holding the heads of both above water; and when disturbed, suddenly diving and displaying her fish-like tail—these, together with her habitual demonstrations of strong maternal affection, probably gave rise to the fable of the mermaid; and thus that earliest invention of mythical physiology may be traced to the Arab seamen and the Greeks, who had watched the movements of the dugong in the waters of Maabar." It is right, however, that we should bear in mind the possibility of the existence in the ocean of cetaceans not yet known to naturalists.—The mermaid is a not unfrequent heraldic bearing. In the heraldry of France, she is called a Siren, and in Germany she is occasionally furnished with two fishy tails.

**MERMAID'S GLOVE** (*Hatichondria palmata*), a sponge pretty common in the British seas, and the largest of British sponges. It grows in deep water, and is sometimes two feet in height. It receives its name from the somewhat finger-like arrangement of its branches. It is not slimy, and has a very porous surface; rough, with myriads of minute fragile spicules. Its color is yellowish.

**ME'ROË.** See **ETHIOPIA**.

**MERO'PIDÆ.** See **BEZ-EATER**.

**MEROVINGIANS**, the first dynasty of Frankish kings in Gaul. The name is derived from Merwig or Merovaens, who ruled about the middle of the 5th c., having united a few tribes under his sway. His grandson, Chlodwig or Clovis (q. v.), greatly extended his dominions, and on his death divided his kingdom among his four sons, one of whom, Chlotar or Clotaire I., re-united them under his own sway in 568. On his death in 561 the kingdom was again divided into four parts—Aquitaine, Burgundy, Neustria, and Austrasia. His grandson, Clotaire II., again united them in 613; but after his death in 628, two kingdoms, Neustria and Austrasia, were formed, in both of which the Merovingian kings retained a merely nominal power, the real power having passed into the hands of the mayors of the palace. The dynasty of the M. terminated with the deposition of Childeric IV. in 752, and gave place to that of the Carolingians (q. v.), sprung from the Austrasian mayor of the palace.—The chief authority for the earlier parts of the history of the M., is Gregory of Tours. See also Thierry's "Recits mérovingiens" (Par. 1839), and Pertz, "Geschichte der merov. Hausmeier" (Leip. 1819).

**MERRIMAC**, a river of New England, U. S., rising in New Hampshire, and falling into the Atlantic Ocean at Newburyport, after a course of about 120 miles. It receives several small tributaries, and has numerous falls, affording immense water-power, on the principal of which are the manufacturing towns of Nashua and Manchester, in New Hampshire, and Lowell and Lawrence, in Massachusetts. Navigable 15 miles to Haverhill.

**MERSEBURG**, a town of Prussian Saxony, capital of a circle of the same name, on the Saale, 60 miles south-south-east of Magdeburg. The cathedral, a noble specimen of medieval architecture, is surmounted by four beautiful towers, and has one of the largest organs (with 4000 pipes) in Germany. It contains the monument of Rudolf of Swabia, an aspirant to the imperial title, who was here defeated and slain (1080) by Henry IV.; a bronze plate in low relief, probably the oldest medieval effigy extant. The castle—a picturesque edifice, mostly of the 15th c.—was once a real-

dence of the Saxon princes. Cotton and woollen goods, paper, and tobacco are here manufactured, and bleaching and brewing are carried on. The beer of M. is famous. Pop. (1875) 13,678. It was near this town that the emperor Henry the Fowler gained his famous victory over the Hungarians in 934.

**MERSEY**, an important river of England, separates, in its lower course, the counties of Cheshire and Lancashire, and has its origin in the junction of the Thame and Goyt, on the borders of Derbyshire, east of Stockport. It flows in a west-south-west direction, and is joined on the right by the Irwell from Manchester, at which point it becomes navigable for large vessels. Besides the Irwell, the chief affluents are the Bollin and the Weaver from Cheshire. At its junction with the Weaver, the M. expands into a wide estuary, which forms the Liverpool channel. The estuary is about 16 miles long, and from 1 to 8 miles broad; opposite Liverpool it is a mile and a quarter in width, with a considerable depth at low water. It is much obstructed by sandbanks; but the excellent system of pilotage in practice here renders the navigation comparatively secure. Cougars, shrimps, flounders, and sparlings abound in the river and estuary. Entire length with the estuary, nearly 70 miles.

**MERTHYR-TY'DVIL** is a market-town of South Wales, with a population, in 1871, of 51,949 within the parish, which has a local board of health. The parliamentary borough embraces Aberdare and two other outlying districts; pop. 97,090. It is on the northern border of the county of Glamorgan, abutting upon the county of Brecknock, and surrounded by lofty hills. It is built upon the river Taff, 500 feet above sea-level, 34 miles from its mouth and port at Cardiff; and it includes the junctions of the greater and lesser Taff, the Morlais, and the Dowlais, streams which there unite to constitute the main river. M. is the seat of the iron trade of Glamorgan, as represented by the great works of Dowlais, Cyfarthfa, and Plymouth, and in a less degree by that of Penydarren. It also contains large collieries, and is celebrated, with Aberdare, for the excellence of its steam coal. The annual make of finished iron in this place, chiefly in the shape of rails, merchant-bars, girders, and ship-plates, may be stated roughly at 200,000 tons. The exports of coal are considerable, and are increasing, but the chief consumption is within the works. The population are all directly dependent upon the works, there being no other trade or manufacture. Railways branch from M. to Brecon, to Swansea, to Cardiff and Penarth, and to Newport and Hereford. The borough was created by the first Reform Act, and now returns two members. Its chief town-officer is the headborough of the lordship, called the "High Constable," and its government is vested in a Local Board. Dowlais contains some fine public buildings, but M. is deficient in this respect. Though a busy, it is not a striking place, having risen very rapidly with the local trade, and having attained nearly its present dimensions before it was under any but the ordinary parochial government. There are, however, symptoms of improvement. It is well supplied with water, and the infantile mortality, long extraordinary, is now reduced. The people, chiefly Welsh, are industrious, and, on the whole, very orderly. There are 17 established churches, and 118 dissenting chapels in the borough.

**MERTON COLLEGE**, Oxford. The House of the Scholars of Merton, commonly called M. C., the model of all the secular colleges, was first founded in Maldon in Surrey by Walter de Merton, Bishop of Rochester, and Lord High Chancellor, in 1264, for the maintenance of 20 scholars in the schools of Oxford, and of a warden and three or four ministers of the altar, who were to manage the property. Before 1274, he transferred his warden and ministers to Oxford—thereby not only founding his own college, but contributing in no small degree to fix the university in its present locality. The fellows were to be as many as the means of the house could maintain, and after some changes, this number was fixed by Archbishop Laud at 24. They were to be elected first and chiefly from the founder's kin; but this was from an early period evaded, and the commissioners of 1552 speak of "a common belief in the university that the elections to fellowships at Merton were formerly determined by personal interest." In 1290, Dr Wyllot, Chancellor of Exeter, endowed twelve *portionists*, or postmasters as they are now called, equivalent to the scholars of other colleges; and in 1604, John Chamber, fellow of Eton, endowed two more—restricted, however, to foundationers from Eton. By the ordinances under 17 and 18 Vict. c. 81, considerable changes were made—six fellowships were

suspended, of which two were assigned to increase the postmasterships, &c., and four to the endowment of the Linacre professorship of physiology, of value £800 per annum. The remaining 16 were thrown open, and not to exceed £250 per annum, exclusive of rooms, until the original number of 24 was restored. The number now being completed, they have reached their limiting value of £500. Sixteen postmasterships, and four scholarships (founded by Henry Jackson in 1753), each of the value of £80 a year, are open without restriction, and tenable for 20 terms from election; but the two postmasterships on the foundation of John Chamber are only to be thrown open in default of candidates from Eton being found duly qualified. This college possesses 18 benefices, to some of which, however, certain other patrons present in turn.

**MERU**, in Hindu Mythology, a fabulous mountain in the centre of the world, 80,000 leagues high. It is the most sacred of all mythical mountains, the abode of Vishnu, and endowed with all imaginable charms.

**MERULIDÆ**, or *Turdidæ*, a family of birds of the order *Insectores*, sub-order *Dentirostres*, having arched and compressed bills, which are pointed and notched, but not strongly. They are regarded by many naturalists as intermediate between the *Laniadæ* (Shrikes, &c.) and the *Sylviadæ* (Warblers, &c.). The species are very numerous, and are arranged in many genera. They are very widely distributed over the globe, some of them being found in cold and some in warm climates. Some are migratory; a few species are gregarious at all seasons, many are gregarious only in winter. They generally build their nests in trees. They feed chiefly on soft animal and vegetable substances, as berries, insects, and worms. Many of them are birds of very sweet song; some are remarkable for their imitative powers. To this family belong thrushes (among which are reckoned the black-bird, rookwing, fieldfare, ring-ouzel, &c.), orioles, mocking-birds, dippers, &c.

**MESAGNA**, a town of the province of Lecce, in Southern Italy, situated amidst scenery of oriental beauty, 37 miles north-west of Lecce, and surrounded by strong walls. The district around is fruitful, and yields delicious oil, which forms an important article of the trade of Mesagna. Pop. 8500.

**MESEMBRYACEÆ**, or *Ficoideæ*, a natural order of exogenous plants, both herbaceous and shrubby, but all succulent. As defined by some botanists, it includes the orders *Tetragoniaceæ*, *Sesuviaceæ*, &c., of others. Of the more restricted M., about 400 species are known, a few of which are natives of the south of Europe, but none are British; the greater number belong to South Africa and the South Sea Islands.—The Ice Plant (q. v.) belongs to this order. The leaves of some species when burned, yield soda in great abundance. Large quantities of burilla are made from them in the Canary Islands, in Spain, and in Egypt. The seeds of some, as *Mesembryanthemum crystallinum* (the Ice Plant), and *M. geniculiflorum*, are ground into flour to make bread. *M. geniculiflorum* is used as a pot-herb in Africa. The fruit of *M. edule* (Hottentot's Fig) is eaten in South Africa, and that of *M. acutilaterale* (Fig's-faces) in Australia.—*M. emarcidum* is called *Kou* by the Hottentots, who beat and twist up the whole plant, allow it to ferment, and chew it like tobacco. When newly fermented, it is narcotic and intoxicating.—Some species of *Mesembryanthemum* are now common annuals in flower-gardens in Britain.

**MESENTERY**, Mesenteric Disease. The mesentery derives its name from being connected to the middle portion (Gr. *meson*) of the small intestine (*enteron*). It is a broad fold of peritoneum (the great serous membrane of the abdomen), surrounding the jejunum and the ileum, and attached posteriorly to the vertebral column. Its breadth between the intestinal and vertebral borders is about four inches; its attachment to the vertebral column is about six inches in length, and its intestinal border extends from the duodenum to the end of the small intestine. It serves to retain the small intestines in their place, while it at the same time allows the necessary amount of movement, and it contains between its layers the mesenteric vessels, the lacteal vessels, and mesenteric glands. These glands are 100 to 150 in number, and are about the size of an almond. They exert an organising action on the contents of the lacteals, the chyle being more abundant in flurine and in corpuscles after it has passed through them. Hence, it is obvious that disease of these



Meshid  
Moss

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glands must always seriously affect the process of assimilation. The most important affection of these organs is their scrofulous or tubercular degeneration, which gives rise to the disease known as *Tubercles Mesenterica*, a disease most common in childhood, but confined to no period of life. In the great majority of cases, it is associated with, and often marked by, other results of the tubercular or scrofulous diathesis, such as pulmonary consumption, tubercular peritonitis, scrofulous disease of the spine, rickets, &c.; but sometimes the mesenteric glands seem almost exclusively affected, in which case the disease becomes sufficiently distinct to allow of easy detection. The leading symptoms are acceleration of the pulse, occasional fever, especially towards evening, loss of color and flesh, derangement of the digestive organs (constipation or diarrhoea, and occasional vomiting), a steady pain in the region of the navel, increased by pressure; but perhaps the most characteristic symptom is tumefaction and hardness of the abdomen, with general emaciation. The enlarged glands can sometimes be detected by a careful examination with the hand, especially in advanced cases. The progress of the disease is generally slow, but at length hectic fever sets in, the emaciation becomes extreme, dropsical effusion appears, and the patient dies exhausted, if not cut off by the access of some acute inflammation.

The treatment mainly consists in the administration of cod-liver oil, or, if the stomach is too irritable to bear that medicine, of iodide of potassium, combined with some bitter infusion, the bowels being at the same time carefully attended to. The application of stimulating liniments, or of iodine ointment, or the abdomen is often of great service. When the disease has advanced to a considerable extent, remedies are of little use, except to palliate some of the more urgent symptoms.

Independently of the disease that has just been noticed, inflammation of these glands is by no means uncommon, when the mucous membrane of the small intestine is ulcerated, as, for example, in typhoid or enteric fever.

MESHID, a important city of Persia, capital of the province of Khorassan, in a fertile and well-cultivated plain, on the Tejend, in lat.  $36^{\circ} 17'$  n., long.  $59^{\circ} 40'$  e. It is by far the most important town of the north-east of Persia, being the centre of numerous converging routes. The city presents a surprising and beautiful view from a distance. Above the walls, which are of vast circuit, shine the gilded dome of one of the most splendid mosques of the East, the beautiful minarets of the tomb of Imaum Riza, a follower of Ali, and the summits of other sacred buildings. M., as the chief seat of the great sect of the Shiites, is of nearly equal importance with Mecca, the sacred city of the orthodox Mohammedans, and hence it abounds in "holy" men, arrayed in green turbans and sashes, who instruct the pilgrims visiting the city. The town carries on manufactures of woollen goods and of metal-ware, especially sword-blades, gold work, and articles of jewellery. It is a famous place of pilgrimage, and a centre, to some extent, of education. Caravans arrive almost daily. Pop. 70,000. In the neighborhood are the ruins of Thus, the old capital of Khorassan, which contains the tomb of the celebrated poet Firdusi.

MESILLA, a town and valley on the Rio Grande, New Mexico, U.S., acquired of Mexico in 1834 by purchase, under the Gadsden treaty. Lat.  $32^{\circ} 17'$  n., long.  $106^{\circ} 45'$  w. It is a narrow, but fertile valley, on the southern overland route to California. The town, settled in 1850, had in 1870 a population of 1878.

MESMER, Franz (according to others, Friedrich-Anton), the founder of the doctrine of Animal Magnetism (q. v.), or Mesmerism, was born in 1733 or 1734, at a village near the Bodensee. He studied at Vienna, and there took the degree of Doctor of Medicine in 1766. About 1772, he began, along with Father Hell, to investigate the curative powers of the magnet, and was led to adopt the opinion, that there exists a power similar to magnetism, which exercises an extraordinary influence on the human body. This he called Animal Magnetism, and published an account of his discovery, and of its medicinal value, in 1775. Honors were conferred upon him in Germany. In 1778, he went to Paris, where he attracted much attention. His system obtained the support of members of the medical profession, as well as of others; but he refused an offer of an annual pension of 20,000 livres (about £800) to reveal his secret; and this, combined with other circumstances, gave rise to suspicion, and induced the government to appoint a commission, composed of physicians and naturalists, whose report was unfavorable to him. He now fell into disrepute, and

after a visit to England, retired to Meersburg, where he spent the rest of his life in complete obscurity. He died March 5, 1816.

**ME'SMERISM.** See **ANIMAL MAGNETISM**.

**MESNE LORD** is, in English Law, a lord who is himself a tenant to some other lord, called a lord paramount. The phrase is, however, not now used, because subinfeudation was abolished in the time of Edward I.—**MESNE PROCESS** was the name given to writs which issued in respect of a pending action before final judgment was given.—**MESNE PROFITS** are the profits or rents drawn by a person who is wrongfully in possession of real property, and who is afterwards ejected, in which case the mesne profits are recoverable, along with the estate itself.

**MESOPOTAMIA** (Gr. *mesos* middle, and *potamos*, a river), the region between the Euphrates and the Tigris; but the name is generally applied to the northern part of this region, which is called by the Arabs *Al-Jesira* (the Island). The northernmost districts of M. are mountainous, being penetrated by the southern spurs of the mountains of Armenia; all the rest is a plain, rarely broken by rocky heights. This plain is dry steppe, green with vegetation only in the wet season; but wherever it is naturally watered, or artificially irrigated, it displays fertility. The inhabitants consist chiefly of Turks, Kurds, Turcomans, and Yesids, with Armenians in the north, and Syrians and Arabs in the plains. The chief occupation of the people is the feeding of cattle; and of the civilisation of ancient times, or even of that which prevailed in a later period (during the Ayubite rule), few or no traces now exist. M. forms a part of the Turkish empire, and is divided into several *eyalets* or governments. For the history of the country, see **AS SYRIA**, **BABYLONIA**.

**MESOZOIC** (Gr. *middle-life*), a term introduced by Professor Phillips to designate the group of geological periods, the fossil remains of which differ equally from those of the **Palæozoic** (ancient-life) and **Cainozoic** (newer-life) epochs. It is synonymous with the more generally employed term **Secondary**, and includes the rocks of the Triassic, Oolitic, and Cretaceous periods.

**ME'SPILUS.** See **MEDLAR**.

**MESS** (Fr. *mete*, Old Fr. *mes*, Ital. *messo*, a dish, from Lat. *misetum*, sent, or served up) originally signified a dish or portion of food; but is used in the British army and navy in the sense of a number or association of officers or of men taking their meals together. In societies consisting entirely of the male sex, and of one set of men continually thrown together, it is a very important social point that the mess should be well regulated. There are consequently stringent rules—both of the service and of mutual etiquette—laid down for its government. One officer acts as caterer, receives subscriptions from the several members, charges the wine to those who drink it, &c.; a steward has charge of the more menial department, arranging for the cooking, purchase of viands, servants, rations, &c.

In the navy, the Admiralty lend the plate and glass; in the army, such expenses are met by the mess fund, which is kept up by a contribution not exceeding thirty days' pay, or difference of pay, on the appointment or promotion of an officer, and an annual subscription from each officer not exceeding eight days' pay, which subscription, in the case of subalterns, is, since 1872, paid by the state. Of course, each officer has to pay periodically his share of the general expense for provisions, &c. In the navy, this expense is limited to £3 a month per head for the ward-room mess, and £1 10s. in the gun-room. In the army, there is no specific limit, but commanding officers are enjoined to enforce proper economy. Government assists the mess of regiments serving at home, and on certain foreign stations where the necessities of life are expensive, with an annual allowance of £25 for each troop or company. The whole of this allowance is to be applied in aid of the cost of the first allowance of wine, and towards reducing the daily expense of the mess, &c. The annual vote for this allowance is about £40,000.

In regiments, there is the officers' mess, to which all the officers of the regiment are bound to subscribe their regulated entrance-fee; but it is optional with married officers to use it or not, and if they elect not to do so, they are exempted from the annual contribution, and only pay for their share of the consumption on the special occasions when they may attend. The sergeants have also a mess, when the commanding officer can succeed in establishing one. It is considered necessary for dis-

Messalina  
Messiah

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cipline that these messes should be quite exclusive, though, in continental armies, and especially the French, the case is different, the utmost familiarity being encouraged between all ranks when off duty. The social equality of officers and men, due to conscription and promotion from the ranks, suffices to account for this difference of system. The sergeants draw their *Rations* (q. v.), supplementing them at their discretion; the officers can draw them or not (through their messman) but on foreign stations they almost invariably do so.

There is no mess for staff-officers with an army, unless they form private arrangements among themselves. In the British navy, if the ship be small, there is one general mess—the gun-room—to which all the officers must belong. If the vessel have a considerable complement, there is the ward-room mess (of which the captain is not an effective member, as he dines in his own suite of cabins), for the commander, lieutenants, master, chaplain, paymaster, marine officers, surgeon, assistant-surgeon, and chief-engineer; the gun-room, for sub-lieutenants, second masters, midshipmen, cadets, and master's assistants; and the engineers' mess (governed by the rules for the gun-room), for engineer officers below the rank of chief-engineer. Officers or civilians voyaging in a ship of war as passengers are ordinarily elected honorary members of the mess to which their rank would entitle them. Rations are not issued to members of a mess; but each is granted, in lieu thereof, an allowance of £1 a month, with the power of purchasing ship's provisions at government rates. Common seamen and common soldiers, in the navy and army respectively, *mess* together in tables comprising a certain number, according to their ratings or squads; but this has no reference to the technical meaning of *messing* as applied to officers, and is merely for the purpose of economy of fuel and labor in the cooking of their rations.

**MESSALINA.** Valeria, the daughter of Marcus Valerius Messala Barbatus, and wife of the Roman emperor Claudius, a woman infamous for her lasciviousness, her avarice, and the atrocities which she perpetrated. Taking advantage of the weakness and stupidity of the emperor, she played the adulteress without restraint, and unreluctingly caused all to be put to death who stood in the way of her unhallowed gratifications. The best blood of Rome flowed at her pleasure. Among her victims were the daughters of Germanicus and Drusus, Julia and Antonia, M. Vinicius, Valerius Asiaticus, and her confederate Polybius. She went so far in vice as to offer her charms for sale like a common prostitute; and at last, during a temporary absence of the emperor, she publicly married one of her favorites, G. Silius, upon which Narcissus, one of the emperor's freedmen, represented to him that M. was aiming at his destruction, and received orders for her execution. She was put to death by Eudus, a tribune of the guards, in the gardens of Lucullus, 48 A.D. Her name has become a by-word for crime and lust.

**MESSENGERS.** King's (Queen's), officers employed by secretaries of state to convey dispatches at home and abroad. In former days, their occupation consisted, to a considerable extent, in serving the secretaries' warrants for the apprehension of persons accused of high treason and other grave offences against the state, nor was it unusual for them to keep the prisoners whom they apprehended at their own houses. They are now principally employed in foreign service.

**MESSENGERS-AT-ARMS,** the officers who execute the process and letters of the Courts of Session and Justiciary in Scotland. They are appointed by, and are under the control of the Lyon King-at-Arms (q. v.). Act 1587, c. 45, contains various provisions regarding these officers, which show that, prior to that period, the Lyon exercised jurisdiction over them, both as to their admission and the trial of complaints against them. There are a certain number of messengers-at-arms in every county of Scotland, amounting in all, at present, to about one hundred.

**MESSENEA,** a district in the south-west of the Peloponnesus, bounded on the e. by Laconia, on the n. by Arcadia and Elis, and on the s. and w. by the sea. It was composed chiefly of extensive plains, watered by the *Pamisos* and other streams. Those plains were famous for their fertility, and particularly for their wheat-harvests. At an early period, after the Doric conquest, it rose to power and opulence. Its chief cities were Messene, Methone, and Pylor. It is chiefly noted for its two wars with Sparta, known as the Messenian Wars, the first of which

(according to the common chronology) lasted from 743 to 724 B.C.; and the second from 685 to 686 B.C. In both instances, the Messenians were defeated, and in consequence, a great part of them emigrated to Sicily, where they took possession of Zancle, which then received the name of Messana, the present Messina. After the lapse of 300 years, Epaminondas invited their descendants back to Greece, and they joyfully responded to his invitation. M. is the name of one of the *nomarchies* of the modern kingdom of Greece.

MESSIAH (Heb. *Mashiach*), equivalent to the Greek *Christos*, the Anointed, designates, in the Old Testament, the great deliverer and Saviour, whom the Jews expected to be sent by God, not only to restore their country to the power and splendor which it exhibited in the days of David, but even, by compelling the Gentiles to acknowledge the supremacy of the theocratic people, to raise it to the summit of universal dominion. This large conception, however, first begins to develop itself after the time of Solomon; for the oldest biblical records in their Messianic indications refer rather to the high degree of prosperity which the chosen people were to expect for themselves. This expectation, already visible in the Abrahamidae, appeared for a moment to have realised itself in the conquest of Canaan; but the subsequent, and often disastrous wars (in the period of the "Judges" and of Saul), as well as the internal feuds and dissensions of the Hebrews themselves—left it, in point of fact, unfulfilled. Nevertheless, the hope of the appearance of the M. had rooted itself strongly in the people, and during the glorious and peaceful reigns of David and Solomon, had so grown and enlarged, that even after the secession of Israel, and during the momentous ages that elapsed until its destruction as a kingdom, not only was the hope of a universal world-sovereignty, and of an extraordinary degree of prosperity, warmly cherished, but it was also confidently expected that God would raise up a branch from the stem of David as the M., the founder of the national prosperity, and the bringer-in of the all-embracing theocracy. That branch was declared to be "the anointed of the Lord," and since David applied that epithet to himself, the Jews transferred it to the deliverer whom they expected, and called him "Son of David." The prophetic writings contain many such allusions to the M., whose coming was expected shortly, and even during the time of the generation then living, whose birthplace, in congruity with his Davidic descent, was announced to be Bethlehem, and who, it was believed, was to be endowed with Divine attributes. These prophetic allusions are commonly termed MESSIANIC PROPHECIES. Along with such, the prophets associated the idea of a forerunner (Elijah, Jeremias, or Moses), whose function was to prepare the people for the appearance of the Messiah. The coming of the Messianic kingdom was to be preceded by a period of severe misfortune and bitter sorrows, the purpose of which was the reconciliation of the people with God (Isaiah i. 25, &c.; Joel iii.; Dan. ix.; Zech. xiii.). These sorrows are called the woes of the M.; they are minutely described in the second book of Ezechiel—an apocryphal work. Hence spring up the idea of a suffering M.—widely diffused among the Jews—who, by enduring grief and shame, should make atonement for the people, and reconcile them with God. This conception was greatly strengthened by the picture in Isaiah (chapters lii. and liii.), of a "servant of God," which, in fact, is generally regarded as the most distinct prophecy of the Saviour. Hence the step further of considering the M. an offering and sacrifice for the sins of the people, was an easy one; yet, on the other hand, it is singular that no trace of this is found in the Apocrypha, not to mention the popular belief of the Jews, that the M. was to live for ever (John xii. 34), that a crucified Saviour was a stumbling-block to them (1 Cor. i. 23), that even the disciples of Jesus did not comprehend his allusions to his death, and that their faith in him as the M. was for long dim and doubtful. In fact, this popular belief of the Jews was the very reason why they did not recognise Jesus as the Messiah. In the later Judaism (as it shews itself in the Talmud), the conceptions of the M. are rich in singularities. It was believed that the *true* M., the son of David, would be preceded by another Messiah, a son of Joseph, or Ephraim, who should suffer death for men as a sin-offering. Century after century, the Jews have expected the former, and repeatedly have they risen and placed themselves under the standard of dreamers, fanatics, and impostors, who took to themselves the sacred name; as, for example, BAR-COCHBA (q. v.) in the 2d c.; one Moses in the Isle of Candia, in the 5th c.; one Julian in Palestine, in

the 6th c.; several in Persia and Arabia in the 12th c.; and as late as the 16th c.; Sabatai Zevi, in Aleppo. Even yet, the hope of a M. is not dead in the hearts of the strict Talmudistic Jews.

The *crucial* question of theology, however, is not the form in which the doctrine (so to speak) of the M. was held by the Jews. All rational students of Scripture, whether "orthodox" or "heterodox," now admit that its growth was gradual, and that it acquired precision and definiteness of outline in the course of ages from its first rude phase, among the pastoral princes of the Syrian wilderness, down to that sublime yet shadowy personality—the Man of Sorrows—that continually floats before the vision of the "Younger Isaiah." The grand question is: Was this doctrine essentially a Divine inspiration, an objective truth of God, or only a lofty conception of the religious soul? The strict rationalistic theologians maintain—and endeavor to prove by an analytic examination of the Gospels—that Jesus assumed the dignity of M., either to accommodate himself to a rooted conception of his countrymen, or partly because he had come to believe it himself—a conclusion, it is said, at which he might arrive quite honestly, since he felt that the *truth* which he taught was the real and only "kingdom of God," and that therefore he was justified in applying to himself all that was said (tropically) by the prophetic poets in old times concerning him who should usher in this "golden age" of the world's faith. The mass of orthodox theologians, on the other hand, regarding the so-called Messianic prophecies of the Old Testament as positive, divinely suggested (perhaps, even on the part of their authors, *conscious*) predictions of Jesus Christ, repudiate the principle of accommodation, or even spiritual application, and try to show that the Saviour accepted the Messianic prophecies as literally and exclusively applicable to him. The historico-spiritual school, represented in Germany by men like Neander, Rothe, Tholuck, &c., and in England, generally speaking, by the divines of the "Broad Church" party, occupy a middle position between these two extremes: with the rationalists, they hold that the Old Testament doctrine of the M. was gradually developed, contains many human elements, and does not imply any knowledge of the historical Jesus on the part of those who announce it; with the "orthodox," on the other hand, they assert that the doctrine is the expression of a fact, not of a sentiment—that Jesus of Nazareth was actually the Son of God, the appointed M., and that in him the so-called Messianic prophecies were fulfilled in a far higher sense than ever the prophets could have dreamed. It will thus be seen that the rationalists resolve the doctrine of the M. into a merely *subjective* religious idea; while the orthodox, and also the historico-spiritual school of theologians, hold that the doctrine was the expression of a divine fact—the *substance* of a heavenly faith.

MESSINA, a city of Sicily, chief town of the province of same name, one of the most ancient and most important cities of the island, is charmingly situated on the strait of M., encircled by a zone of abrupt conical rocks, and commands a view of Calabria. Pop. in 1871, 71,921. The town is enclosed by old walls, and has several fine squares and wide lava-paved streets. The harbor, which is formed by a projecting tongue of land curved in the form of a sickle (whence its primitive name *Zaucle*—Gr. *sickle*—see *MESSANIA*), is about four miles in circumference, and can contain a thousand ships; it is defended by a citadel and six forts; the depth is sufficient to admit vessels of large size; and the quays are spacious. The trade of M., chiefly in silk, oil, wine, coral, fruits, linseed, fish, &c., although less extensive than formerly, is still an important source of wealth to Sicily. The chief imports are cotton and woollen manufactures, hardware, and other articles of colonial produce. The damasks and satins of M. are excellent, and the fisheries important. M. has steam-boat communication with Naples, Marseille, and Malta. In the 16th c., M. was a renowned seat of learning, and in the 16th c. a famous school of painting was founded there by Pelidoro da Caravaggio. In modern times it has undergone terrible vicissitudes, having been ruthlessly bombarded by the royal forces on several occasions during the war of independence in 1848.

MESSINA, Straits of (Ital. *Faro di Messina*, Lat. *Mamertinum fretum*), between Italy and Sicily, are 2½ miles in length, and vary from 2½ to 10 miles in breadth. A strong current runs through the strait, which is of great depth. See *SCYLLA* AND *CHARYBDEIS*.

**ME'SSUAGE**, the legal term used in English law to describe a dwelling-house and piece of land adjoining.

**ME'STRE**, a town of Northern Italy, in the province of Venice, and 5 miles north-west of the city of Venice, on the margin of a lagoon. It is connected with Venice, Padua, and other places by railway. There are many villas around the town and along the road to Padua, reaching almost to that city. *M.* has a considerable transit-trade. Pop. 8500.

**METACE'NTRE**. See **HYDROSTATICS**.

**METAL** (in Heraldry). The field of the escutcheon and the charges which it bears may be of metal as well as of color; and the two metals in use among heralds are gold and silver, known as *or* and *argent*. It is a rule of blazon that metal should not be placed on metal, or color on color.

**METALLURGY**, is the art of extracting metals from their ores. The operations are partly mechanical and partly chemical. Those processes which depend principally on chemical reactions for their results have reference chiefly to the roasting and smelting of ores, and are described under the heads of the different metals. But there are certain preliminary operations of a mechanical kind which metallic ores undergo, such as crushing, jigging, washing, &c., which we shall describe here, as they are essentially the same for the ores of lead, copper, tin, zinc, and indeed most of the metals. (For *Iron*, see that head.)

Ores are first broken up with hammers into pieces of a convenient size for crushing or stamping. Waste material, such as pieces of rock, spar, &c., which always accompany ore, are as far as possible picked out by hand, and the ore itself arranged in sorts according to its purity. Various kinds of apparatus, such as riddles, sieves, &c., are then used for separating it into different sizes, in order to secure a uniform strain on the crushing machinery.

The ore is raised by means of small wagons, to the platform, where it is ready to be supplied to the crushing-rollers. These rollers are mounted in a strong iron frame, held together by wrought-iron bars, and bolted to strong beams. Their distance apart is regulated by means of a lever, to which a weight is attached. The bearings of the rollers slide in grooves, so that when any extra pressure is put upon them by a large or hard piece of ore, the lever rises, and allows the space between the rollers to widen. The crushed ore falls upon a series of sieves, which are made to vibrate. These have meshes increasing in fineness as they descend; and the upper two are so wide that pieces of ore too large to pass through them are conducted into the lower part of the bucket-wheel, and raised again to the platform to be re-crushed. The lower four sieves separate the remaining portion of the crushed ore into different degrees of fineness, which is collected in the pits.

Instead of crushing-rollers, sometimes a stamping-mill is used, especially for tin ores, which require to be reduced to a fine powder. The stamping-mill consists of a series of upright shafts with a weighty piece of iron at the bottom of each. They are raised by means of an axle with projecting cams, and then falling by their own weight, act like hammers.

After being crushed, the ore is washed and sifted on a jigging sieve. The ore is placed on the table from which the sieve is filled. It is then immersed in a tub of water and a jigging motion communicated to it by a workman alternately raising and lowering a handle. This effects two purposes—it washes the ore, and it separates the material into two layers: the upper consists of the lighter spar and other impurities, which are raked off; and the lower consists of the heavier and purer portions of the ore, which are now ready for the roasting furnace.

It will be apparent that in the bottom of the tub there must be a quantity of more or less valuable ore, which, from its fineness, has fallen through the sieve. This is called *sludge* or *slime*; and the minute particles of ore it contains are recovered either by simply forming an incline on the ground, and washing it with a current of water, or by using an inclined table, called a *slewing-table*. Ore which has been reduced to powder at the stamping-mill, as well as *slime*, is washed by this apparatus. The material is put into the chest, which is placed in a sloping position, and is supplied with water on turning the stopcock. The current carries the contents of the chest through the opening at the bottom, and spreads it, with the aid of a series of

stops, or small bits of wood, over the surface of the table. A stream of water is then kept flowing over the table till the earthy impurities are all carried down into the trough, the pure particles of the ore remaining, by reason of their greater specific gravity, near the top of the table, whence they are removed to be smelted. Sometimes the table is suspended by chains, and receives a succession of blows at the top from a *buffer*, moved by cams on the same principle as the stamping-mill. This arrangement is found of great advantage in dressing very poor ores.

The variety of machinery and apparatus used in dressing ores is very great, and they pass under different names in different districts, but they are all very similar in principle to those we have described.

**ME'TALS, ME'TALLOIDS.** Although each metal is considered in a separate article, there are various points regarding the general physical and chemical characters of these bodies, and the method of classifying them, which require notice.

It is not easy to define a metal. All the elements are usually divided by chemists into two groups—viz., the non-metallic bodies or metalloids, and the metals; the list of non-metallic bodies containing all those elements in which the characteristic properties of the bodies popularly known as metals (such as silver, gold, iron, &c.) are wanting; these characteristic properties being their metallic lustre, their opacity, and their capacity of conducting heat and electricity. The non-metallic elements are 14 in number—viz., oxygen, hydrogen, nitrogen, sulphur, selenium, tellurium, phosphorus, chlorine, bromine, iodine, fluorine, carbon, boron, and silicon, of which five are gases, one a liquid, and the rest are solids at ordinary temperatures.

The division of the elements into these two great groups is, however, not based upon any definite scientific grounds, and it is still an open question whether some of the metalloids, as, for example, tellurium and silicon, should not be placed amongst the metals. The non-metallic bodies or metalloids being only remarkable as a group for their negative properties, require no special consideration, and we therefore proceed to notice the general properties of the metals.

The following are the most important of the *physical* properties of the metals.

1. All metals, unless when they are in a finely pulverised form, exhibit more or less of the characteristic lustre termed metallic. Two of the non-metallic elements, iodine and carbon, in some forms, present also a metallic lustre.
2. All metals are good conductors of heat and electricity, although in very unequal degrees.
3. With the exception of mercury, all the metals are solid at ordinary temperatures. With the exception of gold, copper, calcium, and strontium, the metals are more or less white, with a tendency to blue or gray. Most of them have been obtained in crystals, and probably all of them are capable of crystallising under certain conditions.
4. Metals are remarkable for their opacity, and, with the exception of gold, do not transmit light, even when they are reduced to extremely thin leaves.
5. All the metals are fusible, although the temperatures at which they assume the fluid form are very different (see *FUSING POINTS*); and some of them, as mercury, arsenic, cadmium, zinc, &c., are also volatile.
6. Great weight, or a high specific gravity, is popularly but erroneously regarded as a characteristic of a metal; while platinum, osmium, and ridium (the heaviest bodies known in nature), are more than 20 times as heavy as water, lithium, potassium, and sodium are actually lighter than that fluid.
7. Great differences are observable in the hardness, brittleness, and tenacity of metals. While potassium and sodium may be kneaded with the finger, and lead may be marked by the finger-nail, most of them possess a considerable degree of hardness. Antimony, arsenic, and bismuth are so brittle that they may be easily pulverised in a mortar; while others, as iron, gold, silver, and copper, require great force for their disintegration. Taking iron and lead as representing the two extremes of tenacity, it is found that an iron wire will bear a weight 26 times as heavy as a leaden wire of the same diameter. See *DUCTILITY, MALLEABILITY*.
8. It is a remarkable property of the metals, that none of them are capable of being dissolved without undergoing chemical change. Sulphur, phosphorus, iodine, &c., may be dissolved, and after the evaporation of the solvent, may be re-obtained with all their original properties; but this is never the case with metals.

Amongst the chief *chemical* properties of metals we next notice:

Their strong affinities to certain of the non-metallic elements. All the metals, without exception, combine with oxygen, sulphur, and chlorine, and often in several

proportions, forming oxides, sulphides (formerly termed sulphurets), and chlorides. Many of them combine with bromine, iodine, and fluorine. The other compounds of this nature, excepting carbide (formerly carburet) of iron, or steel, and the hydrides of arsenic and antimony (commonly known as arseniuretted and antimonyuretted hydrogen), which are of importance in toxicology, may be passed over without notice.

The metallic oxides are, without exception, solid bodies, insoluble in water, and usually present a white or colored earthy appearance. Hence the old name of *metallic calx* for these oxides.

Those oxides which are termed basic possess the property of directly uniting with the so-called oxyacids (such as sulphuric, nitric, carbonic, and silicic acid), and of forming a new chemical compound of the second order, termed a *salt* (q. v.).

The compounds of the metals with chlorine, iodine, bromine, and fluorine, such, for instance, as chloride of sodium, or common salt ( $\text{ClNa}$ ), are termed *haloid salts* (q. v.). The same metal may often combine both with chlorine and with oxygen in more than one proportion. For example, we have subchloride of mercury ( $\text{Hg}_2\text{Cl}$ ); suboxide of mercury ( $\text{Hg}_2\text{O}$ ); chloride of mercury ( $\text{HgCl}$ ); oxide of mercury ( $\text{HgO}$ ). For the compounds of the metals with sulphur, see **SULPHIDES OF THE METALS**.

Metals enter into combination with one another when they are fused together, and such combinations are termed *Alloys* (q. v.), unless when mercury is one of the combining metals, in which case, the resulting compound is termed an *amalgam*. It is doubtful whether all alloys are true chemical compounds. Definite compounds of the metals with each other do, however, certainly exist, and are sometimes found native, as, for example, the crystallised silver and mercury compound represented by the formula  $\text{AgHg}_2$ .

In consequence of their strong affinities for the metalloids, the metals are seldom found in a free or uncombined state, even in the inorganic kingdom, and never in animals or plants. The more common metals, in consequence of their strong affinity for oxygen and sulphur, are very rarely met with in the uncombined state; but some of those which are less abundant, such as gold, silver, and platinum, are found uncombined, in which case the terms *native* and *virgin* are applied to them; and other metals, as mercury and copper, occur both in a free and in a combined state. Many native alloys are found, but the ordinary sources of the metals are oxides, sulphides, chlorides, and carbonates, sulphates and other salts. These are termed the *ores* of the metals. The methods of obtaining the metals from their various ores fall under the head of **METALLURGY**.

Various classifications of the metals have been suggested by different chemists. The following is probably one of the most convenient:

I.—The *Light Metals*, subdivided into—

1. The metals of the alkalis—viz., potassium, sodium, cesium, rubidium, lithium.

2. The metals of the alkaline earths—viz., barium, strontium, calcium, magnesium.

3. The metals of the true earths—viz., aluminium, glucinum, zirconium, yttrium, erbium, terbium, thorium, cerium, lanthanum, didymium.

II.—The *Heavy Metals*, subdivided into—

1. Metals whose oxides form powerful bases—viz., iron, manganese, chromium, nickel, cobalt, zinc, cadmium, lead, bismuth, copper, uranium, thallium.

2. Metals whose oxides form weak bases or acids—viz., arsenic, antimony, titanium, tantalum, niobium (or columbium), tungsten, molybdenum, tin, vanadium, osmium.

3. Metals whose oxides are reduced by heat—noble metals—viz., mercury, silver, gold, platinum, palladium, iridium, ruthenium, rhodium, osmium. (Several of the rare metals are here omitted.)

Another classification is that by which the *M.* are arranged in six groups, each group being named after a metal which possesses the common characters in a well-marked degree: viz., (1.) the sodium group; (2.) the calcium; (3.) the iron; (4.) the copper; (5.) the platinum; and (6.) the antimony groups.

**METAMORPHIC ROCKS.** Few of the deposits forming the crust of the earth remain in the condition in which they were deposited. By infiltration of a cement-



ing fluid, by pressure, or by some other indurating agency, sand has become converted into sandstone, and clay and mud into shale. In some strata, this operation has been carried still further. There is a class of rocks, including gneiss, mica-schist, clay-slate, marble, and the like, which, while certainly of aqueous or mechanical origin, have, by intense molecular action, become more or less crystalline. To them, the convenient name Metamorphic (Gr. transformed) Rocks has been given by Lyell.

The Metamorphic Rocks were formerly considered to be the fundamental strata of the earth's crust. The original incandescent mass, it was said, losing its heat by radiation, a solid uneven crust of granite was formed. As soon as the ordinary atmospheric and aqueous agencies began to operate, a disintegration took place, and the abraded materials carried down by the waters, were deposited in the basins which contained the boiling sea. It was thought that this not only accounted for the condition in which the Metamorphic Rocks now exist, but for the remarkable undulations and contortions so characteristic of these strata. Gneiss and the allied crystalline schists were accordingly placed as the lowest sedimentary strata in a division equivalent to the Paleozoic Period, and called the *Azoic*, because they were destitute of organic remains, the conditions in which they were formed being opposed to the existence of animals.

It is now, however, known that Metamorphic Rocks occur as contemporaneous deposits in all epochs of the earth's geological history. In Canada and in the Hebrides, they are of Laurentian age; in the Highlands of Scotland, Cambrian and Silurian; in Devon and Cornwall, Old Red Sandstone and Carboniferous; and in the Alps, Oolitic and Cretaceous, and in some parts even Tertiary. Although deposits of such various ages have been thus altered, the resulting rocks are in structure and composition very similar; their ultimate constituents do not differ from those of ordinary clays and sandstones. In all of them, silica forms the largest proportion, consisting of about 60 to 70 per cent.; alumina follows next, and then other substances in smaller quantities, such as lime, soda, potash, iron, &c. This similarity of composition, and the abundance of clays and sandstones, suggest the supposition that the Metamorphic Rocks may be nothing more than these deposits greatly altered; this is confirmed by many observed instances, in which aqueous strata are continuous with, and gradually change into, Metamorphic Rocks. The granite of Dartmoor has intruded itself into the slate and slaty sandstone, twisting and contorting the strata. Hence some of the slate rocks have become micaceous; others more indurated, having the characters of mica-slate and gneiss; while others, again, appear converted into a hard-zoned rock, strongly impregnated with felspar. In some places in the Eastern Pyrenees, the chalky limestone becomes crystalline and saccharoid as it approaches the granite, and loses all trace of the fossils which it elsewhere contains in abundance. These illustrations tell of changes occurring in the proximity of granite, and it has been consequently somewhat hastily concluded that this rock, coming up in a molten condition from below, has, by the radiation of its heat, produced the metamorphosis. But the observed stratigraphical position of granite, its sometimes passing by insensible degrees into gneiss, and the experiments of Solly and Bryson on its internal structure, shew without doubt that this rock is, at least in many places, an extreme result of metamorphic action, and not the cause of it. To call the energy producing these results metamorphic or molecular action, is simply to hide our ignorance—we get a name, but nothing more. To speak dogmatically on a subject so obscure, is a sign of the same ignorance. The following, however, are the most probable agents that, together or separately, produced these remarkable changes:

1. *Heat*.—From whatever source derived, heat does exist, either distributed universally, or occurring locally in the mass of the earth; and where it exists, thermo-electric influences induce action, which, carried on over immense series of years, might produce in the end great changes. It is generally maintained that granite is the result of crystallisation from perfect fusion, and that the strata converted into gneiss must have been reduced to a state of semi-fusion. But we know of crystallisation taking place in the most compact amorphous solids without any approach to fusion, as in the axes of railway-carriages; and of metamorphic action without semi-fusion, as in the highly indurated bottoms of bakers' ovens, in which the clay is subjected to a long-continued though not a great heat; or in the sandstone floor

of an iron furnace, which, from long contact with the molten iron, loses its color, becomes white and hard, and breaks with a porcelainic fracture, having, indeed, been changed into quartz rock. Besides, the frequent occurrence of cavities in the rock crystals of gneiss containing a fluid which fills them only when the temperature is raised to at least  $94^{\circ}$  F., shews that the crystal could not have been formed at a higher temperature. We are therefore safe in maintaining, that the heat was not in all cases so great as to produce fusion.

2. *Pressure*.—This alone is sufficient to effect the consolidation and induration of aqueous deposits, converting clay or sand into solid stone. When heat is added to pressure, greater activity is likely to be the result. The undulatory movements of the earth's crust, by carrying down to great depths deposits formed on the surface, bring them under the influence of pressure, heat, and thermo-electricity, and at the same time elevate rocks that have been thus acted upon.

It is thought that heated water may be also a powerful agent, especially when it is subjected to great pressure.

These and other agents, then, operating through immense intervals of time, set in motion chemical attraction, whereby the various substances which entered into the composition of the sedimentary deposits rearranged themselves as they are found in the Metamorphic Rocks.

The description of the various Metamorphic Rocks will be found under their different names, viz., GNEISS, QUARTZITE, MICA-SCHIST, CLAY-SLATE, and MARBLE.

**METAMORPHOSIS** (Gr. change of form) denoted, in the mythology of the ancients, those transformations of human beings into beasts, stones, trees, and even into fire, water, &c., in fables of which that mythology abounded. The origin and significance of such fables it is often impossible to determine. Some of them probably originated in observation of the wonderful transformations of nature; some in a misapprehension of the metaphors employed by the older poets; and some, perhaps, in mere superstition and love of the marvellous. The wild imagination of the Orientals filled their mythologies with metamorphoses in the greatest number; and the classic mythology approaches to them in this respect. They were the theme of some of the poets and other Greek authors of the Alexandrine period, and of Ovid among the Latin classics. The medieval literature of Europe, especially of Germany, in its fairy tales and other forms of folk-lore, is also wonderfully rich in metamorphoses.

**METAMORPHOSIS OF ANIMALS.** This term is applied to changes which certain animals undergo after their escape from the envelope of the egg, and which are of such a nature as essentially to alter the general form or the mode of life of the individual.

The most remarkable metamorphoses occur in the Batrachians, Crustaceans, Insects, and Tape-worms, and are briefly noticed in the articles on those classes of animals. For an excellent general account of the metamorphoses of animals, the reader is referred to a series of articles by De Quatrefages in the "*Revue des Deux Mondes*" for 1853.

**METAMORPHOSIS OF ORGANS,** in Botany, a subject of so much importance, that it has been exalted to the rank of a distinct branch of botanical science, under the name of *Morphology* or *Vegetable Morphology*. Attention to it is essential to a philosophical study of botany; yet it may almost be said that nothing was known either of its facts or its laws, till the poet Goethe proclaimed them to the world in his treatise entitled "*Die Metamorphose der Pflanzen*," in 1790. Linnæus had, indeed, called attention to the development of organs, and the changes which they undergo, and had made this the subject of a "thesis" entitled "*Prolepsis Plantarum*" in 1760; but, in a manner very unusual with him, he mixed up with his observations and philosophical speculations certain fanciful suppositions, the falsehood of which soon becoming apparent, caused all the rest to be neglected. Wolff afterwards extricated the true from the fanciful in the views of Linnæus, and gave them greater completeness; but he introduced the subject only incidentally in a paper on comparative anatomy, which failed to attract the attention of botanists, and probably had never been seen by Goethe, whose discovery, apparently altogether original, is one of the finest instances on record of acute observation combined with philosophical generalisation.

Metamorphosis  
Metayer

16

The metamorphosis of organs is noticed in the articles on particular organs. It is only necessary here to make a very general statement of its facts and laws. A plant is composed of the *axis* and its *appendages*; the axis appearing above ground as the stem and branches, below ground as the root; the appendages being entirely above ground, and essentially *leaves*; all organs which are not formed of the axis being modified leaves. The proof of this consists very much in the gradual transition of one organ into another, manifest in some plants, although not in others; as of leaves into bracts, one of the most frequently gradual transitions; of leaves into sepals, as seen in the leaf-like sepals of many roses; of sepals into petals, as seen in the petal-like sepals of lilies, crocuses, &c.; of petals into stamens, as seen in water-lilies; and even of stamens into pistils, often exemplified in the common house-leek. The proof is confirmed and completed by observation of the monstrosities which occur in plants, particularly in the frequent return of some part of the flower to its original type, the leaf, and in the conversion of one part of the flower into another, which is often the result of cultivation, and is particularly illustrated in *double* flowers, the increase of the number of petals being the result of the conversion of stamens into petals.

A flower-bud being a modified leaf-bud (see *BUD*), and a flower therefore the development of a modified leaf-bud, the parts of a flower correspond in their arrangement with the leaves on a branch. But peculiar laws govern the development of organs in each species of plant. Thus, the leaves in one are opposite; in another, alternate; in another, whorled; all depending on the law which governs the growth of the axis in relation to the development of leaves, which is very constant in each species; and in like manner the parts of the flower are developed in whorls around an abbreviated terminal portion of the axis, the energies of the plant being here directed to the reproduction of the species, and not to the increase or growth of the individual. The fruit itself, being formed from the pistil, is to be regarded as formed of modified leaves. Goethe truly says: "The pod is a leaf which is folded up and grown together at its edges, and the capsule consists of several leaves grown together; and the compound fruit is composed of several leaves united round a common centre, their sides being opened so as to form a communication between them, and their edges adhering together."

The metamorphosis of organs has been investigated with great diligence and success, and beautifully elucidated by Miquel, Lindley, Schleiden, and other botanists.

#### METAMORPHOSIS OF TISSUE. See *TISSUE*.

**METAPHOR** (Gr. *metaphora*, a transference), a figure of speech, by means of which one thing is put for another which it only resembles. Thus, the Psalmist speaks of God's law as being "a light to his feet and a lamp to his path." The metaphor is therefore a kind of comparison, in which the speaker or writer, casting aside the circumlocution of the ordinary similitude, seeks to attain his end at once, by boldly identifying his illustration with the thing illustrated. It is thus of necessity, when well conceived and expressed, graphic and striking in the highest degree, and has been a favorite figure with poets and orators, and the makers of proverbs, in all ages. Even in ordinary language the meanings of words are in great part metaphors; as when we speak of an *acute* intellect, or a *bold* promontory.

**METAPHYSICS**, a word of uncertain origin, but first applied to a certain group of the philosophical dissertations of Aristotle (see *ARISTOTLE*). As since employed, it has had various significations, and more especially two—a larger and a more confined. In the more confined sense, it is allied to the problems of the Aristotelian treatise, and is concerned with the ultimate foundations of our knowledge of existing things. What is the nature of our knowledge of the external world, seeing that mind cannot properly know what is not in contact with itself? has been asked by philosophers, and answered in various ways; and this is the great question of metaphysics (see *PERCEPTION*, *COMMON SENSE*). The name "Ontology" has been applied to the same inquiries into our cognizance of existences out of ourselves. But as the solution of this difficult question was found to involve an investigation into the nature of the human mind, it became allied with the science whose object it is to describe fully and systematically the laws and properties of our mental constitution—a science called by the various names of Psychology, Mental Philos-

ophy, Moral Philosophy; and hence Metaphysics came to be an additional name for this more comprehensive department. The word is employed at the present day by writers of repute in both meanings. Thus, Ferrier's "Institutes of Metaphysic" is occupied solely with the questions connected with knowledge, or the nature of our perception of an external world; his explanatory title is, "The Theory of Knowing and Being." On the other hand, Mansel's Metaphysics is divided into two parts—Psychology, or the science of the facts of consciousness, which expresses the science of mind generally; and Ontology, or the science of the same facts considered in their relation to realities existing without the mind—that is, the problem of Perception, or Metaphysics in the narrower sense.

METASTASIO (originally Trapassi), Pietro, one of Italy's most admired poets, was born at Rome in 1698, of humble parents, and gave early evidence of his genius by his boyish improvisations. M. having attracted the casual notice of Gravina, a famous juriconsult of the day, the latter undertook the entire education and career of the youth, whose paternal name of Trapassi became thenceforward Gleesied into Metastasio, both words being identical in signification. The young poet speedily advanced in classical and general knowledge; and to his patron's enthusiastic devotion to the Greek drama, may doubtless be traced much of the after-bent of M.'s own poetical tastes. By the early death of Gravina, M. was placed in possession of considerable property. In 1724, he published one of his most celebrated dramas, "La Didone," which, with "Il Catone" and "Il Siroe," conferred on the poet a European name. In 1780, M. accepted the post of poet-laureate to the Imperial court of Vienna. During his sojourn in Vienna, M. composed his "Giuseppe Riconosciuto," "Il Demofonte," and the "Olimpiade." He died at Vienna in 1782. M. was distinguished for the generosity, integrity, and candor of his nature, the sincerity of his friendships, and the disinterested warmth of his sentiments. His works are innumerable, embracing 68 dramas, 48 cantatas, besides a vast number of elegies, canonette, sonnets, and translations. They enjoy unexampled popularity among all grades of his countrymen; in their pure classical subjects and forms, the educated student finds instruction and delight; while their facile musical grace and verbal simplicity adapt them to the popular appreciation of the artless beauties of poetry. The best editions of M. are those of Turin (1757, 14 vols.); Paris (1755, 12 vols.); Paris (1780, 12 vols., large 8vo); Genoa (1802, 6 thick vols.); Mantua (1816—1820, 20 vols.).

METAYER (Ital. *metà*, Fr. *moitié*, half), in French, is the cultivator of a *metairie*, or farm, the tenant of which gives the landlord a portion of the produce as his rent. In some of the older French dictionaries, such as that of Trevoux, the word is said to apply to any kind of farmer, but in the oldest dictionary of French and English, Cotgrave's, the word is thus interpreted: "Properly one that takes ground, to the halves, or binds himself by contract to answer unto him of whom he holds them half, or a great part of the profits thereof." The term has lately got a meaning in political economy on account of some eminent writers having raised the question, whether this arrangement between landlord and tenant is not so much more advantageous than any other, both to the parties immediately concerned, and to the public at large, that it ought to be specially encouraged. Sismondi appears to have been the first to open this wide view of the influence of the practice, and he has given a chapter to its consideration in his Political Economy (b. iii. chap. 5). He says what cannot be denied, that such an arrangement was a great improvement on mere serfdom, which gave the cultivator no interest in the produce of his industry. But in giving the reasons for his admiration of the system as one which provides in the general case for the wants of the peasant while relieving him of all anxiety about markets and prices, he admits that a metayer peasantry never advance beyond the humble, happy, and contented lot which immediately falls to them. It is a system, therefore, inconsistent with the application of large capital to cultivation, and consequently with the extraction of the highest value which the soil can yield. A tenant will hesitate to lay £50 worth of guano on his fields if half the additional crop it will bring goes to his landlord. To those who maintain that the moral effect of the system is beneficial, this will be no argument against it, but to the political economist it is an argument against the practicability of the system in a rich money-making agricultural country. Where there is an enterprising peasantry without capital it is a valuable resource; a great portion of the valuable agricultural dis-

tracts of Scotland were thus brought into cultivation by improvers whose rent was a portion of the crop. But while these very districts in a great measure owe their present prosperity, and the existence of a set of capitalist-farmers to such a system of cultivation pursued with more energy than M. Sismondi considers natural to it, there is no doubt that the substitution of such an arrangement for money-rent would now be a very serious waste.

**METELLUS**, the name of a Roman family of the plebeian gens Cæcilia, which rose to be one of the first families of the Roman nobility.—One of the most distinguished members of the family was **QUINTUS CÆCILIUS M. MACEDONICUS**, who received his surname from his victory over Andriscus, an aspirant to the throne of Macedonia (148 B.C.). His life was considered by ancient writers an example of the greatest felicity. He died 118 B.C.—Another was **QUINTUS CÆCILIUS M. NUMIDIUS**, who twice defeated Jugurtha in Numidia (109 B.C.), and was celebrated for his integrity of character, but was superseded in his command by Marins. His son, **QUINTUS CÆCILIUS M.**, surnamed *Pius*, joined Sulla in 83 B.C., but sought to moderate the severity of his proscriptions. He, too, bore a distinguished character for virtue.—**QUINTUS CÆCILIUS M. CRÆTICUS** conquered Crete, and reduced it to a Roman province (67 B.C.).—**QUINTUS CÆCILIUS M. PIUS SCIPIO**, sometimes called **QUINTUS SCIPIO**, and sometimes **SCIPIO M.**, was a son of Publius Cornelius Scipio, who was adopted by one of the Metelli, and became the father-in-law of Pompey, and his zealous partisan. He commanded under him at Pharsalus, maintained war on his behalf for some time in Africa; and after the battle of Thapsus (46 B.C.), died by his own hand.

**METEMPSYCHOSIS.** See **TRANSMIGRATION OF SOULS.**

**METEOROLOGY** (Gr. *metēōra*, meteors, or atmospheric phenomena) was originally applied to the consideration of all appearances in the sky, both astronomical and atmospheric; but the term is now confined to that department of natural philosophy which treats of the phenomena of the atmosphere as regards weather and climate. The leading points of this wide subject will be found under such heads as **AEROLITES, ATMOSPHERE, BAROMETER, BOILING, CLOUDS, DEW, ELECTRICITY, EVAPORATION, FOG, HAILSTONES, HALOS, HOAR-FROST, LIGHTNING, MAGNETISM, RAIN, SNOW, STORMS, &c.** We confine ourselves here to a historical sketch of the science.

Owing to the complexity of the phenomena, meteorology is the most difficult and involved of the sciences, and seems, indeed, at first sight, almost incapable of being reduced to a science at all. On this account, the only procedure admissible in the first place is long and patient observation, and a faithful recording of facts.

From the nature of the subjects which make up the science, it may be inferred that they occupied men's minds from a remote antiquity. The splendid and ever-varying panorama of the sky, and the changes of temperature through the days and the seasons, with all the other elements constituting the weather, and thus powerfully affecting the necessities and comfort of man, are of a nature well fitted to arrest his attention. From the time spent in the open air in the early ages, and from the imperfect protection afforded against the inclemency of the seasons, those appearances which experience proved to precede a change of weather would be eagerly recorded and handed down. In this way, many most valuable facts were ascertained and passed current from hand to hand; and, perhaps, there is no science of which more of the leading facts and inferences have been from so early a period incorporated into popular language.

Aristotle was the first who collected, in his work "On Meteors," the current prognostics of the weather. Some of these were derived from the Egyptians, who had studied the science as a branch of astronomy, while a considerable number were the result of his own observation, and bear the mark of his singularly acute and reflective mind. The next writer who took up the subject was Theophrastus, one of Aristotle's pupils, who classified the opinions commonly received regarding the weather under four heads, viz., the prognostics of rain, of wind, of storm, and of fine weather. The subject was discussed purely in its popular and practical bearings, and no attempt was made to explain phenomena whose occurrence appeared so irregular and capricious. Cicero, Virgil, and a few other writers also wrote on the subject without making any substantial accessions to our knowledge; indeed the treatise of

Theophrastus contains nearly all that was known down to comparatively recent times. Partial explanations were attempted by Aristotle and Lucretius, but as they wanted the elements necessary for such an inquiry, being all but totally ignorant of every department of physical science, their explanations were necessarily vague, and often ridiculous and absurd.

In this dormant condition, meteorology remained for ages, and no progress was made till proper instruments were invented for making real observations with regard to the temperature, the pressure, the humidity, and the electricity of the air. The discovery of the weight or pressure of the atmosphere made by Torricelli in 1643, was undoubtedly the first step in the progress of meteorology to the rank of a science. This memorable discovery disclosed what was passing in the more elevated regions of the atmosphere, and thus the elevations and depressions of the barometric column largely extended our knowledge of this subtle element. See **BAROMETER**.

The invention and gradual perfecting of the Thermometer (q. v.) in the same century, formed another capital step; as without it, nothing could be known, beyond vague impressions, regarding temperature, the most important of all the elements of climate. This great invention soon bore excellent fruit. Fahrenheit constructed small and portable thermometers, which, being carried by medical men and travellers over every part of the world, furnished observations of the most valuable description—the comparative temperature of different countries became known, and the exaggerated accounts of travellers with regard to extreme heat and cold were reduced to their proper meaning. Scarcely less important was the introduction of the Hygrometer (q. v.), first systematically used by De Saussure (died 1799), and afterwards improved by Dalton, Daniell, and August. From the period of the invention of these instruments, the number of meteorological observers greatly increased, and a large body of well-authenticated facts of the utmost value was collected. The climates of particular parts of the earth were determined, and the science made great and rapid advances by the investigations undertaken by distinguished philosophers into the laws which regulate the changes of the atmospheric phenomena.

The theory of the trade-winds was first propounded by George Hadley in the "Philosophical Transactions" for 1735; and it may be mentioned as a remarkable fact, that, for about half a century, it remained quite unnoticed, when it was independently arrived at by Dalton, and published in his essays.

The publication of Dalton's Meteorological Essays, in 1798, marks an epoch in meteorology. It is the first instance of the principles of philosophy being brought to bear on the explanation of the intricate phenomena of the atmosphere. The idea that vapor is an independent elastic fluid, and that all elastic fluids, whether alone or mixed, exist independently; the great principles of motion of the atmosphere; the theory of winds, their effect on the barometer, and their relation to temperature and rain; observations on the height of clouds, on thunder, and on meteors; and the relations of magnetism and the aurora borealis—are some of the important questions discussed in these remarkable essays, with an acuteness, a fullness, and a breadth of view that leave little to be desired.

One of the most interesting and fruitful subjects of inquiry that engaged the attention of meteorologists was dew. The observations on this subject were first collected and reduced to a perfect theory by Dr Wells. See **Dew**.

In 1828, Daniell published his "Meteorological Essays and Observations," which, while adding largely to our knowledge in almost every department of the subject, are chiefly valuable as bearing on the hygrometry of the atmosphere. Though the practical advantages which he anticipated would flow from it have not been realised, yet this difficult and still obscure department of meteorology stands indebted to him more than to any other philosopher. The law of the diffusion of vapor through the air, its influence on the barometric pressure, and its relations to the other constituents of the atmosphere, are among the least satisfactorily determined questions in meteorology. Since this element is so important as an indicator of storms and other changes of the weather, and since so much remains still to be achieved, it is to be hoped that it will soon be more thoroughly investigated. A most important addition has lately been made to our knowledge of the vapor of the atmosphere by Professor Tyndall, in his experiments on radiant heat, especially as regards the gases. The vapor of water is there shewn to exert extraordinary energy as a radiant and absorbent of heat; and hence the vapor dissolved in the air acts the part of a covering or

protection to the earth. As it is, to some extent, impervious to solar and terrestrial radiation, it follows that if the air were quite drained of its moisture, the extremes of heat and cold would be so intense and insufferable, that all life would instantly perish, there being no screen shielding the earth from the scorching glare of the sun by day, and from the equally scorching and blighting effects of its own radiation by night. It is to be expected that this great discovery will soon throw light on many questions of meteorology.

Electrical observations have been, of all meteorological observations, perhaps the least productive, partly owing to their scantiness, from the expense and trouble attending them, and partly, no doubt, to the free and bad use made of the name of electricity by crude theorists in explaining phenomena of which it would have been wiser to have confessed their ignorance. But the brilliant discoveries which have recently been made on the mutual relations of heat, motion, electricity, magnetism, and the other forces of matter, lead us to indulge the hope that the application of these results to meteorology will be attended with discoveries equally brilliant and important. Humboldt's treatise on "Isothermal Lines" (1817) constitutes a notable epoch in experimental meteorology. Dove has since continued the investigation, and in his splendid work, "On the Distribution of Heat on the Surface of the Globe," has given charts of the world, shewing the temperature for each month, and for the year, and also charts of abnormal temperatures. It is scarcely possible to overestimate the value of this work, for though, to a considerable extent, the lines are hypothetical, there can be no doubt that a close approximation to the march of mean temperature and its distribution over the earth through the year, has been arrived at. The idea has been carried out with greater fullness of detail by the United States' government in the beautiful and elaborate series of charts of temperature and rainfall given in the "Army Meteorological Register" for 1855. In these charts, the temperature and rainfall in the different seasons for every part of the United States, deduced from accurate observations, may be seen at a glance. Buchan has published isothermals for the British Isles, Mohn for Norway, and Blandford for Hindustan; and isothermals for the sea have been published by the Admiralty.

The establishment of meteorological societies during the last twenty years must also be commemorated as contributing in a high degree to the solid advancement of the science which, more than any other, must depend on extensive and carefully conducted observation. In this respect, the United States stand pre-eminent, the observers there numbering nearly 800. Great Britain is also well represented in the English and Scottish societies, which together number above 200 observers. In France, Germany, Russia, &c., the science is also being widely cultivated. Owing to the disastrous flooding of the Rhone, an inquiry has been carried on for several years, having for its object the determination of those causes which affect the rainfall in the basins of the Rhone and Saône. Observers in Germany and Great Britain have been secured to co-operate with the French observers, and under the management of a commission, it may be expected that important conclusions respecting the rainfall and the progress of storms will be arrived at, and means devised to avert the calamity of these great floods, by timely warning being given of their approach.

A special object of meteorological societies is to ascertain the degrees of heat, cold, and moisture in various localities, and the usual periods of their occurrence, together with their effects on the health of the people, and upon the different agricultural productions; and by searching into the laws by which the growth of such products is regulated, the agriculturalist may be enabled to judge with some degree of certainty whether any given article can be profitably cultivated.

But perhaps none of the arts have benefited to so large an extent by the labors of meteorologists as navigation. The knowledge thus acquired of the prevailing winds over the different parts of the earth during the different seasons of the year—and the regions of storms and calms—and the laws of storms, have both saved innumerable lives, and by pointing out the most expeditious routes to be followed, shortened voyages to a remarkable degree. In connection with this, the name of Captain Maury (q. v.) deserves special commendation for the signal service he has rendered to navigation.

Another fruit of the multiplication of meteorological stations is the prediction of storms and "forecasts" of the weather, which have been carried on in the United States, and commenced with ability and success by Admiral Fitzroy in England.

These "forecasts" are based on telegrams which are received every morning from above forty selected stations in Great Britain and Ireland, and on the continent, from Haparanda as far south as Lisbon. These telegrams give the exact state of the barometer, thermometer, hygrometer, and rain-gauge, with the direction and force of the wind, and appearance of the sky at each of these forty stations at eight in the morning. In the event of there being any storm or other atmospheric disturbance at one or more of these places, a full and accurate description of it is thus conveyed to London; and it is thence the duty of the officials there to consider the direction in which the storm is moving, so as to enable them to give warning of its approach by special signals. But in addition to warnings of storms, Fitzroy also issued daily "forecasts" of the weather likely to occur in the different districts of Great Britain for the following two days, and which were in like manner founded on the state of the atmosphere at distant points, keeping in view the atmospheric currents known generally to prevail at that particular time of the year. As the cost of this system was about £2000 annually, a severe test was applied, at the instance of the Treasury, from July 1861 to June 1862, for the purpose of ascertaining whether the expenditure was justified by the success attending it. During the first six months, 413 signals were hoisted, and in 214 cases a storm occurred where a warning was given. It must not be inferred that in the remaining 199 cases there was no storm anywhere; all that was meant was, that no storm occurred at the places where the signal was given; but a storm may have occurred, and probably did occur, in some other part of the country. Now that the system has been longer in use, the signals are given from a better knowledge of the movements of the atmosphere, so that if the test were again applied, the number of failures would be found to be much fewer. Since the barometric depression is in almost all cases spread over a wider area than the storm which accompanies it, and since the storm occasionally passes into the upper regions of the atmosphere, so as to be less felt on the earth's surface at that place, it is obvious that a considerable time must yet elapse before a sufficiently intimate knowledge of the movements of the air be acquired in order to indicate with certainty the particular places where the storm will break out, and where it will not. The problem to be practically worked out is this: Given the telegrams from the stations showing the exact meteorological conditions prevailing over the included area, with indications of a storm approaching in a certain direction, to determine, not the probable area over which the tempest will sweep, but the precise localities which will altogether escape, the places where the storm will rage, and the places where it will not touch the earth, but pass innocuously into the upper regions of the atmosphere: its continuance, its violence, and the particular directions from which the wind will blow at the places visited by the storm while it lasts. Considerable progress has already been made towards the solution of this difficult problem; and if a complete solution be impossible, such an approximation to a solution will doubtless be arrived at as will render it foolhardy to disregard the warnings given.

But these predictions only extend to a few days. Does the present state of the science afford any grounds to hope that prediction for longer periods will yet be attained? Weather-registers extending over long periods give no countenance whatever to the notion, that there are regularly recurring cycles of weather on which prediction may be based. Further, the manner in which good and bad seasons occur in different places with respect to each other, shews clearly that they have little direct immediate dependence on any of the heavenly bodies, but that they depend directly on terrestrial causes. Thus, while the summer of 1861 was almost unprecedentedly wet and cold in Scotland, the same summer was hot and dry to a degree equally unprecedented on the continent of Europe, and particularly in Italy; and such examples may be multiplied almost *ad infinitum*.

The assumption that the equatorial and polar currents of wind at any locality may ultimately balance each other, would appear, from recent observation, to give some ground for prediction extending over considerable intervals. Thus, a wet summer was predicted for Britain in 1862, from the circumstance of a most unusual prevalence of east winds in the spring of that year. An almost incessant continuance of south-west winds followed, which discharged themselves in deluges of rain, clouded skies, and a consequent low temperature. As these south-west winds prevailed till the spring of 1863, less south-west wind was looked for during the sum-



mer, which was thus expected to be fine and warm—a prediction which was realised. This prediction holds in about three cases out of four.

The following are a few standard works on Meteorology, in addition to those already referred to: L. F. Kämtz's "Meteorology," translated from the German (Lond. 1845); Dr Ernst Erhard Schmidt's "Lehrbuch der Meteorologie" (Leipz. 1860); Professor Eddy's "Fourth Report on Meteorology," (Washington, 1867); Drew's "Meteorology," a useful handbook (Lond. 2d ed. 1860); Hertel's "Meteorology" (1861); D. P. Thomson's "Introduction to Meteorology" (1849); Buchan's "Handy Book to Meteorology" (1868); Loomis, "Treatise on Meteorology" (1868).

**METEORS.** The whole subject of meteors was treated in the body of the work under the head of **ÆROLITES**. The subject, however, has since occupied a great deal of attention, and there is at present a tendency on the part of astronomers and physicists to separate that class of meteors known as "shooting-stars" from the group of *meteorolites* (which includes *aëro-siderites*, or masses of meteoric iron; *siderolites*, which are conglomerates of iron and stone; and *ærolites*, which are wholly of stone), on the grounds, that the most prominent appearances of the former are *periodic*, while the latter seem to occur at irregular intervals, and that the former have hitherto not been *proved* to leave any traces of their visit on the earth's surface. We are, however, hardly as yet in a position to decide as to the similarity or dissimilarity of the two classes of bodies.

Popular interest has been largely aroused respecting "shooting-stars," by reason of the brilliant display of them which took place on the night of November 13, 1866. This "star-shower," the grandest that has ever been observed in Britain, was confidently predicted, from the occurrence of a similar shower at the corresponding date 1799, 1833, and 1834; and the extremely favorable state of the atmosphere rewarded those who were on the watch with a complete view of one of nature's most magnificent displays. The shower commenced about 11½ P.M., with the appearance at brief intervals of single meteors; then they came in twos and threes, steadily and rapidly increasing in number till 1h. 13m. A.M. on November 14, when no fewer than 57 appeared in one minute. From this time, the intensity of the shower diminished gradually, wholly ceasing about 4 A.M. The total number of meteors which at that time came within the limits of the earth's atmosphere was estimated at about 940,000, and the number seen at each of the several observatories in Britain averaged 6000. This star-shower, like those of 1833 and 1834, seemed to proceed from the region of the heavens marked by the stars and in the constellation Leo; and it has been shewn by astronomers that this was the point towards which the earth in her orbit was moving at the time; consequently, she had either overtaken the meteoric shower, or had "met" it proceeding in a contrary direction. The meteors on that occasion presented the usual variety of color, size, and duration; the great majority were white, with a bluish or yellowish tinge; a considerable number were red and orange; and a few were blue; many surpassed the fixed stars in lustre, and some were even brighter than Venus (the most brilliant planet as seen from the earth) at her maximum. Most of the meteors left trains of vivid green light 5°–15° in length, which marked their course through the heavens, and endured for 3" on an average, then becoming dissipated; though some of the trains were almost 40° in length, and remained in sight for several minutes. Professor Airy observed that the direction of the meteors' flight was little influenced by the earth's attraction.

On the morning of November 14, 1867, a star-shower equal in magnitude to that of 1866 was observed in France and America, but was almost wholly invisible in Britain, on account of the cloudy state of the atmosphere.

The brilliant display of 1866 gave a vigorous impulse to the astronomical investigation of shooting stars, and it is now generally agreed that the November meteors move in an orbit round the sun, inclined at about 7° to that of the earth, and that, in all probability, this orbit forms a ring or belt of innumerable small fragments of matter, distributed with very variable density of grouping along it, thus corresponding so far to the Planetoid (q. v.) group between Mars and Jupiter. It is also agreed that the motion of this meteor ring round the sun is retrograde; that the earth's orbit at that point where she is situated on November 13–14, intersects this ring; and that, probably, in 1799, 1833–1834, and 1866–1867, it is the same group of meteors which has been observed; and the last-mentioned hypothesis has

been made the foundation of a calculation of the probable orbit and periodic time of this meteor-ring. The fact that a November star-shower generally occurs for two years in succession, and then recurs at an interval of 82 or 83 years, seems to indicate that though the earth may pass through the meteor-orbit every year, the meteors are so grouped at intervals along the ring, and their periodic time differs so much from that of the earth, that it requires 82—83 years before this accumulating difference amounts to a complete revolution of either the earth or the ring, and a repetition of the star-shower becomes possible.

Professor Newton of Yale College, America, who entered into an elaborate investigation of the subject, concluded that the 5 possible periodic times (the earth's being taken as unity) of the meteor-ring were  $2+1-83-25$ ,  $1+1-83-26$ , and  $1-83-26$ , and that of these, the fourth,  $1-1-83-25$ , or 854.62 days, is the actual period of its revolution round the sun, and that, consequently, it has described 84 revolutions while the earth has described 83, the cycle of 84 meteor revolutions differing from 83 years by only 3.17 days; and in accordance with this estimate, he calculated its orbit and the approximate extent (seeing the meteor shower generally occurs in two successive years) of the meteor-group which produces the November showers. His conclusions have, however, been vigorously opposed by other eminent astronomers, such as Professor Adams (q. v.) and Mr Alexander Herschel, both of whom hold that the first four of the possible periods given by Professor Newton are *impossible*, and that the last,  $1-83-25$  (i. e., that the meteor-ring makes  $1-83-25$  of a solar revolution in a year, and one complete revolution round the sun in 83.5 years), is the correct estimate. If this view be correct, the meteor-group must be so much extended along its ring or orbit as to take more than a year to cross the earth's orbit, and a long time must necessarily elapse before a fair estimate of this extent can be obtained. A periodic time of  $83\frac{1}{2}$  years, and an orbit which at the same time approaches so near the sun as to intersect that of the earth, indicate a path of great ellipticity, akin to those of the comets; and the idea of the cometary nature of these meteors derives support from two remarkable facts, the one discovered by Schiaparelli of Milan, that this assumed orbit coincides very nearly with that of the great comet of 1862 (Professor Adams connects this comet with the August meteor), and the other by C. F. W. Peters of Altona, that it coincides with that of Temple's comet.

Mr Alexander Herschel also maintains that the meteors are of recent origin, probably fragments from some of the great luminous bodies, and that though at present assembled in a comparatively dense group, the difference of their relative velocities will have the effect of gradually distributing them all over the meteoric ring, when a November shower will occur every year. Mr Herschel also carefully observed 20 meteors with the view of calculating their weight, from the rate of their motion and the amount of heat (as shewn by their brightness) evolved in the destruction of their velocity, by the resistance of the atmosphere, and found their weight to vary from 80 grains to  $7\frac{1}{2}$  lbs.

The cause of the luminosity of meteors was long a point in dispute, the two chief suppositions being, that the resistance of the atmosphere to a body dashing through it at about 80 miles per second, generated so much heat as to produce ignition; while the other was the action of terrestrial magnetism. The point most strongly urged against the first supposition, by the supporters of the second, was, that the height at which meteors were occasionally seen rendered any action of the atmosphere impossible; but as this objection was founded on the purely hypothetical opinion that the atmosphere did not extend more than about 50 miles from the earth's surface, it was not very cogent. This problem was handled by Sir John Herschel in an able paper published in the "Edinburgh Review" (January 1849), in which he clearly shewed that the very high latent heat of the air in the higher and rarer parts of the atmosphere, would be sufficient to cause an enormous development of heat in the event of the air being compressed before a body advancing into it with a "planetary" velocity. This opinion is now held by almost all eminent men of science. The enormous heat to which the meteor is thus subject, produces incandescence, after which, with more or less facility, according to the nature of the materials of which the meteor is composed, the outer portion becomes liquid, and, by the powerful resistance of the air to the meteor's rapid course, is thrown off in a long stream, forming the tail, which, after rapidly losing its velocity, is precipitated to the earth as a fine

dust like volcanic ash; while the meteor thus rapidly and constantly diminishing as it flies along in its headlong course, either becomes wholly dissipated into "tail," falls to the earth, or makes its way out beyond the limits of the earth's atmosphere, and continues its course. This supposition of exclusive atmospheric agency also gives a plausible explanation of the phenomenon of meteors "bursting," this being caused by the sudden heating and consequent expansion of the outer part, while the interior was still in the state of intense cold acquired while in interplanetary space.

While astronomers physicists in general have been thus trying to reduce the phenomena of meteors to a system, their chemical brethren have not been idle. Public collections of meteoric bodies have been made at Vienna, the British Museum, Paris, Berlin; and private ones by Mr Greg of Manchester, Baron Reichenbach in Austria, and Professor Shepard in America; and opportunities have thus been afforded of determining the nature of their composition.

**METHODISTS**, the name originally given, about the year 1729, by a student of Christ-Church to the brothers Wesley, and several other young men of a serious turn of mind, then members of different colleges of Oxford, who used to assemble together on particular nights of the week chiefly for religious conversation. The term was selected, it is believed, in allusion to the exact and *methodical* manner in which they performed the various engagements which a sense of Christian duty induced them to undertake, such as meeting together for the purpose of studying Scripture, visiting the poor, and prisoners in Oxford jail, at *regular* intervals. Subsequently, it came to be applied to the followers of Wesley and his coadjutors, when these had acquired the magnitude of a new sect; and though their founder himself wished that "the very name," to use his own words, "might never be mentioned more, but be buried in eternal oblivion," yet it has finally come to be accepted by most, if not all of the various denominations who trace their origin mediately or immediately to the great religious movement commenced by John Wesley. For an account of the origin and earlier development of Methodism, see articles on the brothers **WESLEY** and **WHITEFIELD**. We confine ourselves here to a brief notice of its organisation, doctrine, and present condition.

1. *Organisation*.—This appears to have been partly improvised by Wesley to suit the exigencies of his position. It was not a theoretical and premeditated, but a practical and *extempore* system. In the "Rules of the Society of the People called Methodists" drawn up by himself, he says: "In the latter end of the year 1739, eight or ten persons came to me in London, who appeared to be deeply convinced of sin, and earnestly groaning for redemption. They desired (as did two or three more the next day) that I would spend some time with them in prayer, and advise them how to flee from the wrath to come, which they saw continually hanging over their heads. That we might have more time for this great work, I appointed a day when they might all come together, which, from thenceforward they did every week, viz., on Thursday in the evening." This he calls "the first Methodist Society." Its numbers rapidly increased, and similar "societies" were soon formed in different parts of England, where the evangelistic labors of the Wesleys had awakened in many minds "a desire to flee from the wrath to come, and be saved from their sins"—the only condition, we may remark, required of any for admission into these societies. In order to ascertain more minutely how the work of salvation was progressing in individual cases, Wesley subdivided the societies into "classes," according to their respective places or abode, each class containing about a dozen persons, under the superintendence of a "leader," whose duties are partly religious and partly financial. 1. He has to see each person in his class once a week, "to inquire how their souls prosper, and to encourage, comfort, or censure, as the case may require. 2. To collect the voluntary contributions of his class, and pay it over to the "stewards" of the society, and to give the ministers all necessary information regarding the spiritual or bodily condition of those under his leadership. For preaching purposes, on the other hand, the societies were aggregated—a certain number of them constituting what is called a circuit. This now generally includes a town, and a rural circle of ten or fifteen miles. To each circuit, two, three, or four ministers are appointed, one of whom is styled the "superintendent;" and here they labor for at least one year, and not more than three. Every quarter, the classes are visited by the ministers, who make it a point to converse personally with every member; at the termination of which pro-

ceeding, a "circuit-meeting" is held, composed of ministers, stewards, leaders of classes, lay-preachers, &c. The stewards (who are taken from the societies) deliver their collections to a circuit-steward, and the financial business of the body is here publicly settled. At this quarterly meeting, candidates for the office of the ministry are proposed by the president, and the nomination is approved or rejected by the members. Still larger associations are the "districts," composed of from ten to twenty circuits, the ministers of which meet once a year, under the presidency of one of their number, for the following purposes: 1. To examine candidates for the ministry, and to try "cases" of immorality, heresy, insubordination, or inefficiency on the part of the clergy. 2. To decide preliminary questions concerning the building of chapels. 3. To investigate and determine the claims of the poorer circuits to assistance from the general funds of the body. 4. To elect a representative to the committee of Conference, whose duty is to nominate ministers for the different stations for the ensuing year—their appointments, however, being subject to the revision of Conference. In all the financial and other purely *secular* business of the districts, laymen (such as circuit-stewards and others) deliberate and vote equally with the clergy. The supreme Methodist assembly is the "Conference." The first was held in 1744, when John Wesley met his brother Charles, two or three other clergymen, and a few of the "preachers"—men whom his zeal and fervor had induced to abandon their secular employments, and devote themselves to declaring the message of the Gospel. The purpose for which he called them together was, he says, "for the sake of conversing on the affairs of the 'societies' . . . . and the result of our consultations we set down to be the rule of our future practice." In the course of his life, Wesley presided at forty-seven of these annual assemblies. The Conference now consists of 100 ministers, mostly seniors, who hold their office according to arrangements prescribed in a Deed of Declaration, executed by John Wesley himself, and enrolled in Chancery. But the representatives previously mentioned, and all the ministers allowed by the district committees to attend—who may or may not be members of the legal Conference—sit and vote usually as one body, the 100 confirming their decisions. In this assembly, which is exclusively clerical, every minister's character is subjected to renewed and strict scrutiny, and if any charge be proved against him, he is dealt with accordingly; candidates for the ministry are examined both publicly and privately, and set apart to their sacred office; the entire proceedings of the inferior courts (if we may so call them) are finally reviewed; and the condition, requirements, and prospects of the body are duly considered.

2. *Doctrine and Worship.*—Under this head, not much requires to be said. Wesleyan Methodists claimed to be considered *orthodox*, *Protestant*, and *evangelical*. The propriety of the last two appellations will probably not be disputed, but a rigid Calvinist might object to the first. They accept the *articles* of the English Church, but believing these articles to have been framed on a basis of *comprehension*, they consider themselves at liberty to accept them in an Arminian sense. It must not, however, be supposed that they are out-and-out Arminians. Their great distinguishing doctrine is the universality and freedom of the atonement; hence they reject the Calvinistic doctrine of predestination (which they conceived to be incompatible with the former), but while they maintain the freedom of the will and the responsibility of man, they also maintain his total fall in Adam, and his utter inability to recover himself. If these two appear to the human understanding to conflict, it is nevertheless asserted that the Bible teaches both; and it is objected to high Calvinism, that in its anxiety to be logical, it has shewn itself unscriptural. Prominence is also given by the Wesleyan M. to certain points of religion, some of which are not altogether peculiar to them. They insist on the necessity of men who profess to be Christians feeling a *personal interest* in the blessings of salvation—i. e., the assurance of forgiveness of sins and adoption into the family of God. This, however, is not to be confounded with a certainty of *final salvation*. They believe the Spirit of God gives no assurance to any man of that, but only of *present pardon*. In harmony with this view, they reject the doctrine of the necessary perseverance of the saints, and hold that it is fearfully possible to fall from a state of grace, and even to perish at last after having "tasted of the heavenly gift," and having been "made partakers of the Holy Ghost." They also maintain the perfectibility of Christians,

or rather the possibility of their entire sanctification as a privilege to be enjoyed in this life. But Wesley "explains" that "Christian perfection does not imply an exemption from ignorance or mistake, infirmities or temptations; but it implies the being so crucified with Christ as to be able to testify, 'I live not, but Christ liveth in me.'" He regards the sins of a "perfect" Christian as "involuntary transgressions," and does not think they should be called "sins" at all, though he admits that they need the atoning blood of Christ. The Wesleyan Methodists in their religious services use more or less the English liturgy; the morning service being read in many of their chapels, and the sacramental offices being required in all. They observe a "watch-ought" on the eve of the New Year, on which occasion the religious services are protracted till midnight, and their chapels are generally crowded to excess; and in the beginning of the year they hold a "covenant-service," at which congregations stand up to a man (though this form is not invariable), and solemnly vow to serve the Lord. But even the ordinary religious services in some places are frequently marked by an ebullition of fervent feeling on the part of the audience, which has a very singular effect upon a stranger.

3. *History.*—The history of Methodism is for many years the history of Christian effort to evangelise the neglected "masses" of England. The labors of Wesley, and of those whom he inspired to imitate his example, were of the noblest description, and met with remarkable success. The reformation of life which his preaching produced, for example, among the Kingswood colliers and the Cornwall wreckers, is a testimony to the power of religion which cannot be too highly estimated. The zeal which has inspired the body in regard to foreign missions, although in the highest degree honorable, is only the logical development of their efforts at home—for they originally regarded their society in England as simply a vast "home mission," and neither Wesley nor his followers desired to consider themselves a "sect," a new church, in the common usage of the term, but were warmly attached to the old national church, and considered themselves among her true children. When Wesley died (1791), his "societies" had spread over the United Kingdom, the continent of Europe, the States of America, and the West Indies, and numbered 50,000 members. Since then, they have largely increased, and, according to the returns for the year 1875, the membership (including the numbers in foreign missions, embracing continental India, Northern Europe, China, Asia Minor, the South Sea and West India Islands) amounted then to 564,315 (of whom 393,343 belonged to Great Britain and Ireland), and the number of ministers, 2905 (of whom 2050 belonged to the United Kingdom). The annual income of "The Wesleyan Methodist Missionary Society" in 1875 was £190,000.

The Wesleyan M. have three theological colleges for the training of ministers, one at Richmond Hill, Surrey, a second at Didsbury, South Lancashire, and a third at Headingley, in Yorkshire, besides the establishments at Sheffield and Taunton; two schools (New Kingswood School and Woodhouse Grove School) for the education of sons of Wesleyan ministers; and two for the daughters, one at Clapton and another at Southport. The boys receive a six years' and the girls a four years' course of instruction. The Methodist Book-room is situated in the City Road, London, and issues hundreds of thousands of religious publications (tracts, &c.) monthly. The newspapers and other periodicals possessed in connection with the body are the larger and smaller Magazines, the "Christian Miscellany," "Wesleyan Sunday School Magazine," monthly "Exercises on Scripture Lessons," "Early days," the "Watchman," the "Methodist Recorder," and the "London Quarterly Review." Among the more eminent Methodist authors may be named the two Wesleys, Fletcher, Benson, Clarke, Moore, Watson, Drew, Edmondson, Sutcliffe, Jackson, Treffry, Rule, Nichols, Smith, and Etheridge.

METHODIST EPISCOPAL CHURCH, the name given to the Society of Wesleyan M. in the United States of America, where the first members of that body—immigrants from Ireland—established themselves as a religious society in New York in the year 1766. In the course of a year or two, their numbers had considerably increased, and they wrote to John Wesley to send them out some competent preachers. Two immediately offered themselves for the work, Richard Boardman and Joseph Pilmoor, who were followed in 1771 by Francis Asbury and Richard Wright. The agitations preceding the War of Independence which soon afterwards broke out, interrupted the labors of the *English* Methodist preachers in America, all

of whom, with the exception of Asbury, returned home before the close of the year 1777; but the place appears to have been supplied by others of native origin, and they continued to prosper, so that, at the termination of the revolutionary struggle, they numbered 43 preachers and 13,740 members. Up to this time, the American Wesleyan M. had laid no claim to being a distinct religious organisation. Like Wesley himself, they regarded themselves as members of the English Episcopal Church, or rather of that branch of it then existing in America, and their "preachers" as a body of irregular auxiliaries to the ordained clergy. "Episcopal churches," we are informed, "are still standing in New York and elsewhere, at whose altars Embury, Pilmoor, Boardman, Strawbridge, Asbury, and Rankin, the earliest Methodist preachers, received the holy communion." But the recognition of the United States as an independent country, and the difference of feelings and interests that necessarily sprang up between the congregations at home and those in America, rendered the formation of an independent society inevitable. Wesley became conscious of this, and met the emergency in a manner as bold as it was unexpected. He himself was only a presbyter of the Church of England, but having persuaded himself that in the primitive church a presbyter and a bishop were one and the same order, differing only as to their official functions, he assumed the office of the latter, and, with the assistance of some other presbyters who had joined his movement, he set apart and ordained the Rev Thomas Coke, D.C.L., of Oxford University, bishop of the infant church, September 2, 1784. Coke immediately sailed for America, and appeared, with his credentials, at the Conference held at Baltimore, December 25 of the same year. He was unanimously recognised by the assembly of preachers, appointed Asbury coadjutor bishop, and ordained several preachers to the offices of deacon and elder. Wesley also granted the preachers permission (which shews the extensive ecclesiastical power he wielded) to organise a separate and independent church under the Episcopal form of government: hence arose the "Methodist Episcopal Church in the United States of America." Nevertheless, there were not a few who were dissatisfied with the Episcopal form of government. This feeling grew stronger and stronger, until, in 1830, a secession took place, and a new ecclesiastical organisation was formed, called the METHODIST PROTESTANT CHURCH, whose numbers, according to the returns for 1874, amounted to 65,000 members and 924 preachers. In 1842, a second secession took place, chiefly on the question of slavery—the seceders pronouncing all slave-holding sinful, and excluding slave-holders from church membership and Christian fellowship; and in 1843, a meeting was held at Utica, New York, where a new society was constituted and named the WESLEYAN METHODIST CONNECTION OF AMERICA, whose members in 1870 amounted to 30,000 and its preachers to 250. But in 1844 a far larger and more important secession took place on the same question, when the whole of the Methodist societies in the then slave-holding states, conceiving themselves aggrieved by the proceedings instituted at the general conference of New York (1844) against the Rev. James O. Andrew, D.D., one of the bishops, and a citizen of Georgia, who had married a lady possessed of slaves, resolved to break off connection with their northern brethren. Hence originated the METHODIST EPISCOPAL CHURCH, SOUTH, whose numbers in 1874 were as follows: Travelling preachers, 3184; local preachers, 5344; and members, 663,196, including whites, colored, and Indians. To these must be added 200,000 members, forming the African Methodist Episcopal Church, and 170,000 of the African Methodist Episcopal Zion Church. In 1869 a movement began in favor of the re-union of the northern and southern sections of the Methodist Episcopal Churches, which may—now that slavery is abolished—be successfully carried out. It may here be stated that the members of the *Northern Methodist Episcopal Church* amounted in 1874 to 1,345,089.

Returning to the English Wesleyan M., we now proceed to mention the various secessions from the parent body in the order of time.

1. **THE METHODIST NEW CONNECTION.**—This society detached itself from the older one in 1797. Its doctrines and order are the same; the only difference being that it admits one layman to each minister into the Conference, and allows them to share in the transaction of all business, both secular and spiritual. These laymen are chosen either by the circuits, or by "guardian representatives" elected for life by the conference. In 1875, the numbers of the New Connection were: members, 24,700; preachers, 169. There were in addition 2849 members on probation.

3. **PRIMITIVE METHODISTS**, vulgarly designated **RANTERS**, were first formed into a society in 1810, though the founders had separated from the old society some years before. The immediate cause of this separation was a disagreement as to the propriety of camp-meetings for religious purposes; and also upon the question of females being permitted to preach. A third point of difference is the admission to their conference of two lay delegates for every minister. In 1875, their numbers were: members, 179,429; preachers 1169.

3. **INDEPENDENT METHODISTS**, who separated in 1810. They are chiefly distinguished by their rejection of a paid ministry, and number in England and Scotland: members, 4000; preachers, 290; scholars, 6000.

4. **BIBLE CHRISTIANS**, also called **BRYANITES**, were formed by a local preacher named Bryan, who seceded from the Wesleys in 1815. The only distinction between them and the original body appears to be that the former receive the eucharistic elements in a sitting posture. In 1875, their numbers were: members, 26,699; preachers, 276.

5. **UNITED FREE CHURCH METHODISTS** have been recently formed by the amalgamation of two sects of nearly equal numerical strength. The older of these, called the **WESLEYAN ASSOCIATION**, originated in 1834 in the removal of one or two influential ministers from the original connection. Points of difference subsequently appeared with regard to the constitution of the conference.—The younger sect, called the **WESLEYAN REFORM ASSOCIATION**, took its rise in 1849 through the expulsion of several ministers from the parent body on a charge of insubordination, and being founded on the same principles as the last-mentioned community, arrangements were entered into for their union, which was subsequently effected. Church independency, and freedom of representation in the annual assembly, are two of the most prominent distinctive traits in the organisation of the United Methodist Free Church. Their united numbers in 1875 were: members, 71,817; ministers, 875; local preachers, 8266.—The *Wesleyan Reform Union* consists of about 20 ministers and 7000 members, who have not amalgamated with the Methodist Free Churches.

This is perhaps also the most convenient place to notice the **WELSH CALVANISTIC METHODISTS**. They are not a secession from the followers of Wesley, but originated partly in the preaching of his friend and fellow-evangelist, Whitefield, and partly in that of Howel Harris, a Welsh clergyman of the Church of England. Whitefield was a Calvinist; Wesley, as we have seen, was on some points decidedly Arminian. A difference arose between them on the subject of election. Henceforward their paths lay in different directions. Whitefield, however, did not form a religious sect; and after his death (1799), his followers, being left without any distinct bond or organisation, either followed the leading of the Countess of Huntingdon (q. v.), or became distributed among other denominations, a large portion, especially in Wales, becoming absorbed in the new society gradually forming itself through the preaching of Howel Harris and his coadjutors. This body, however, was not formally constituted a religious society till the beginning of this century.

**METHUEN TREATY**, a commercial treaty between England and Portugal in 1703, so-called in consequence of being negotiated by Paul Methuen of Corsham, English ambassador at Lisbon. It was agreed, by the treaty, that the wines of Portugal should be received by England at a rate of one-third less duty than those of France. In 1836, the Portuguese government relinquished the stipulations of the treaty.

**METHYL** is an organic radical homologous with Ethyl (q. v.), being the lowest term in the series  $C_nH_{2n+1}$ ,  $n$  in this case being equal to 2. Its formula is  $C_2H_5$ ; but in its free state, two atoms unite to form a single molecule, so that free methyl is more accurately represented by  $(C_2H_5)_2$ . It is a colorless gas, of specific gravity 1.036; it burns with a very feeble bluish flame, and is not liquefied at a temperature of  $0^\circ$ . It is obtained by acting upon iodide of methyl with zinc, in the same manner as in the preparation of ethyl.

Like ethyl, it forms a very numerous class of compounds, of which the following are the most important: *Hydride of Methyl* ( $C_2H_5, H$ ), known as *Light Carburetted Hydrogen* (q. v.), *Marsh-gas* and *Fire-damp*, may be obtained either as

naturally or artificially. As a natural product, it sometimes issues from fissures in coal-seams, rushing forth as if under high pressure. These discharges of this gas are termed "Blowers" by the miners, and it is by the combustion of this fire-damp that the terrific explosions which occasionally take place in coal-pits are caused. For its combustion, twice its volume of oxygen (and consequently ten times its volume of air) is required; the resulting compounds being one volume of carbonic acid and two of steam. The vitiated air thus produced, which is utterly unfit for respiration, is known as the *after-damp* or *choke-damp*, and is as much dreaded as the explosion itself. Hydride of methyl is also one of the gaseous exhalations from marshes and stagnant pools; and the bubbles that rise to the surface when the mud at the bottom of a pond is stirred up, consists chiefly of this gas. It may be prepared artificially by strongly heating a mixture of crystallised acetate of soda, hydrate of potash, and powdered quicklime. It is a colorless inodorous, tasteless gas, which may be breathed without apparent injury if well diluted with air. *Hydrated Oxide of Methyl* ( $C_2H_5O.HO$ ), known also as *Methylic Alcohol*, *Wood Spirit*, and *Pyroxylic Spirit* under which title its properties are described, is the strict homologue of vinous or ethylic alcohol ( $C_2H_5O.HO$ ). *Oxide of Methyl* ( $C_2H_5O$ ), or *Methylic Ether*, corresponds to the ordinary, or, correctly speaking, the ethylic ether, and, like the latter, is produced by the distillation of a mixture of methylic alcohol and sulphuric acid. Oxide of methyl, like oxide of ethyl, combines with acids to form a class of ethereal salts, or compound ethers, as they are termed by some chemists as, for example: Acetate of Methyl (or methyl-acetic ether),  $C_2H_5O.C_2H_3O_2$ ; Butyrate of Methyl (or methyl-butyric ether),  $C_2H_5O.C_4H_7O_2$ ; Nitrate of Methyl (or methyl-nitric ether),  $C_2H_5O.NO_3$ ; Salicylate of Methyl (or methylsalicylic ether),  $C_2H_5O.C_7H_5O_2$ . The last-named compound may not only be obtained by distilling a mixture of pyroxylic spirit with salicylic and sulphuric acids, but occurs ready formed in the vegetable kingdom, constituting the essential oil procured from the *Betula lenta*, a species of birch, and from the *Gaultheria procumbens*, or *Winter Green*.

Methyl may be made to enter into combination with bromine, iodine, chlorine, and fluorine, the bromide and iodide of methyl being colorless fluids, and the chloride and fluoride colorless gases. Amongst the most interesting of the numerous methyl compounds must be mentioned the artificial bases or alkalies, which can be obtained from ammonia by the substitution of one, two, or three equivalents of methyl for one, two, or three of the equivalents of hydrogen contained in the ammonia.

If only one equivalent of hydrogen is replaced by methyl, the resulting compound is  $NH_2(C_2H_5)$  or  $C_2H_7N$ , an extremely alkaline gas known as *methylamine*, or *methyllia*, which is more soluble in water than any other known gas; water at 55° dissolving 1150 times its bulk. It is a frequent product of the destructive distillation of nitrogenous substances; and it is present when many natural alkaloids, such as narcotine and morphia, are distilled with caustic potash. The product resulting from the substitution of two equivalents of methyl for two of hydrogen, and known as *amethylamine*, closely resembles methylamine. When the three equivalents of hydrogen are replaced by three of methyl, the resulting compound is  $N(C_2H_5)_3$  or  $C_6H_{15}N$ , a colorless gas, which is known as *trimethylamine*, or *trimethyllia*, and has a disagreeable fishy odor. It occurs in large quantity in herring-brine, and has been detected in the spirit in which anatomical preparations have been long kept. It is also found in *Chenopodium vulvaria* (Stinking Goose-foot), in the flowers of *Crataegus oxyacantha* (Common Hawthorn), and in ergot of rye.

**METHYLATED SPIRIT** consists of a mixture of alcohol, of specific gravity 0.836, with 10 per cent. of Pyroxylic (q. v.) or wood-spirit. This addition of wood-spirit renders it unfit for drinking, although it scarcely interferes with its power as a solvent. It is allowed by the excise to be sold duty-free for manufacturing purposes, and for preserving specimens in museums.

**METHYLENE**. Bichloride of ( $C_2H_2.Cl_2$ ), is an organic compound which has recently attracted much attention from its value as an anæsthetic agent. Dr Richardson, who has long been studying the physiological properties of the methyl-compounds, with the view of finding amongst them a safer compound than chloro-



form, believes, from his experiments on animals, that in the subject of this article he has found such a compound. As the deaths from chloroform may be computed, according to him, at one in 1500 administrations, it is obvious that there is reason for searching for a still safer anæsthetic agent. Dr Suow, as is well known, thought that he had discovered an almost positively safe agent in Amylene ( $C_{10}H_{16}$ ); but the value of more than 200 safe administrations was at once destroyed by two rapidly succeeding deaths; and hence a large number of successful cases of the new agent must be reported before it will displace chloroform from its present well-deserved position. In the article on METHYL (q. v.), we have shewn that the composition of hydride of methyl (or marsh gas) is expressed by  $C_2H_6$ , H, which may be written  $C_2HHHH$ . Now, according to the theory of substitutions, one, two, three, or even all four of the atoms of hydrogen may be replaced by a corresponding number of atoms of chlorine. Thus, (a) if one atom of H be replaced by one atom of Cl, we have *chloride of methyl*,  $C_2H_5Cl$ ; (b) if two atoms of H are replaced by two atoms of Cl, the resulting compound is *bichloride of methylene*,  $C_2H_4Cl_2$ , the  $C_2H_4$  here representing a new radical termed *methylene*, of which very little is known; (c) if three atoms of H are replaced by three atoms of Cl, the resulting compound is *trichloride of formyle*,  $C_2HCl_3$ , or common chloroform, another radical, viz., *formyle*,  $C_2H$ , now appearing; (d) if the whole of the H is replaced by Cl, the resulting compound is *tetrachloride of carbon*,  $CCl_4$ . We thus have four new bodies which may be constructed step by step out of hydride of methyl or marsh gas, and similarly, by starting with tetrachloride of carbon, the chemist may retrace the individual stages till he gets back to marsh gas. All these derivatives of marsh gas possess the power of producing anæsthesia when they are inhaled as vapor by men and animals. That the latter two—viz., chloroform and tetrachloride of carbon—possess this power, has been long known, Dr P. Smith having especially directed attention to the properties of the last named compound; but that the first two also exert the same influence is a fact new to science, for which we are indebted to Dr Richardson. "I discovered," he observes, "that chloride of methyl was a certain and gentle anæsthetic in July [1867] last, and this led me to hope that something more stable and manageable could be obtained—something that should stand between the chloride of methyl and chloroform. That substance is now found in the bichloride of methylene. That this compound would produce rapid, safe, and easy general anæsthesia, I discovered by experiment on August 30th of the present year."—"Med. Times," October 19, 1867.

It is a colorless fluid, having an odor like that of chloroform; and is pleasant to inhale, as it causes little irritation to the mucous membrane. It boils at  $58^\circ$ , and has a spec. gr. of 1.344, while that of its vapor is 2.937 (or nearly three times that of air). Hence, it boils at a lower temperature than other anæsthetics; while its specific gravity, both as a liquid and a vapor, is lower than that of chloroform, but much higher than that of ether; hence, from its easier evaporation, it requires more free administration than chloroform, and, from its greater vapor density, it should be given less freely than ether. It mixes readily with absolute ether, and this combination yields a vapor containing corresponding proportions of each, their boiling-points only differing at most by  $4^\circ$ . It also combines with chloroform in all proportions. It should have a neutral reaction to test-paper. If a trace of acid be present—which is possible, but not probable—its inhalation might prove dangerous. To prevent decomposition, it should, like chloroform, be well guarded from the action of light.

Pigeons are the animals which Dr Richardson most employs for experiments on anæsthetic agents generally. They present various advantages over most other animals; one of the most important being that they die with singular readiness under the influence of these agents. On exposing three pigeons to the action of the vapor of a drachm of chloroform, bichloride of methylene, and tetrachloride of carbon, the peculiarity in the action of the bichloride is the absence, in the sleep it produces, of the so-called second degree of narcotism. The bird glides from the first degree directly into the third, or that of absolute insensibility. The bichloride enters the circulation freely, and sustains the insensibility so well, that intervals of many minutes may be allowed to pass without readministration; while, from its being transformed altogether into vapor at a temperature lower than that of the body, it can be more readily eliminat-

ted from the system than chloroform, or tetrachloride of carbon, when its administration is withheld. On animals, it acts more evenly on the respiration and circulation than any other of the various substances which Dr Richardson has tried; and the only drawback, yet observed, is, that it sometimes produces vomiting; but this misadventure, so far as we know, has not yet been observed when it has been administered to the human subject, and pigeons are known to vomit on slight provocation. The numbers of the respirations and of the pulse rise and fall together, which "is a good point, because there is no condition more perilous than disturbed balance of the circulating and respiratory systems."

All anaesthetics given by inhalation after a certain dose destroy life; but that the destructive power of this new agent is less than that of either chloroform or tetrachloride of carbon, seems proved.

On trying the vapor upon himself, after ascertaining that it could be safely given to the lower animals, Dr Richardson inhaled it until it produced insensibility. "I found the vapor very pleasant to breathe and little irritating, while drowsiness came on and unconsciousness without any noise in the head or oppression. I recovered also, as the animals seemed to recover, at once and completely. I felt as though I had merely shut my eyes, and had opened them again. In the meantime, I had, however, performed certain acts of a motor kind unconsciously; for I inhaled the vapor in the laboratory, and there went to sleep, but I awoke in the yard adjoining. This was on September 28th last, when I inhaled from a cup-shaped sponge. Since then, I have inhaled the vapor in smaller quantities from several instruments, with the effect of proving that there is little difference required for its administration and that of chloroform. A little more bichloride is required in the earlier stages than would be required if chloroform were being used, the fluid being more vaporisable. One drachm of bichloride to forty minims ( $\frac{2}{3}$ ds of a drachm) of chloroform, represents the difference required; but when the narcotism is well set up, less of the bichloride is required to sustain the effect."

The materials on which this article is based are taken from a lecture delivered by Dr Richardson on the 8th of October 1867. In an address on Anaesthetics by Dr Tidy, published in the "British Medical Journal," Jan. 4, 1879, it is mentioned that Mr Morgan, a dentist, has "administered methylene 1800 times to persons of all ages, and for periods varying from a few minutes to three-quarters of an hour, without a single accident. He also regards it as safer than chloroform, and speaks of the rapidity with which it effects complete unconsciousness, as a rule two minutes only being needed; the rapidity of recovery, from one to three minutes only being required for the anaesthesia to pass away; and lastly, the rapidity with which consciousness may be abolished, if it return during the operation—as the chief points in its favor. The cause of death from its administration is syncope, not coma; hence, a bloodless condition of the lips—a point easily to be noticed—is the principal indication of danger."

On the other hand, the preliminary report on the action of anaesthetics presented to the committee of the British Medical Association, and published in the same number of the "Journal," does not speak so favorably of methylene. The so-called bichloride of methylene, it is alleged, has no definite and constant boiling point, and therefore appears to be a mixture. The formula, as now generally used,  $\text{CH}_2\text{Cl}_2$ , shews it to be a compound of chloride of methyl and chloroform ( $\text{CH}_3\text{Cl} + \text{CHCl}_3$ ). With frogs under methylene it was found that the heart became rapidly affected and soon stopped. With rabbits, respiration rapidly deteriorated and stopped while the heart was still beating. In an experiment with artificial respiration and exposure of the heart, the heart was weakened and soon stopped, but not as rapidly as with chloroform. As in the case of chloroform, the right ventricle became enormously distended, the first sign of paralysis being the commencement of the distension. [Ether does not affect the heart.] The experimenters found that as anaesthetics, *Isobutyl Chloride* ( $\text{C}_4\text{H}_9$ ) and *Ethidene Dichloride* ( $\text{C}_2\text{H}_2\text{Cl}_2$ ) combine the advantages of speed and safety, and are therefore preferable to methylene.

*Chloride of Methyl*, the first of the compounds derived by substitution from hydride of methyl, has, according to good authorities, also valuable remedial qualities. Half an ounce of it, diluted with water, and with the addition of a little sugar, acts as a pleasant but potent intoxicator. In smaller doses, it might be useful as a soothing and refrigerating agent.

**METONIC CYCLE**, so called from its inventor, Meton, who flourished at Athens about 483 B.C., is a cycle of 19 years, at the end of which time the new moons fall on the same days of the year, and eclipses recur in nearly the same order. This arises from the circumstance, that 19 solar years are nearly equal to 235 lunations, their average values being 6939.68835 and 6939.60249 days respectively.

**METONYMY** (Gr. *metonymia*, signifying a change of name) is a figure of speech by which one thing is put for another to which it bears an important relation, as a part for the whole, the effect for the cause, the abstract for the concrete, &c. For example, "*Lying lips* are an abomination to the Lord." This figure is very expressive, and is much used in proverbial and other pithy modes of speech.

**METOPÉ**, the space, in the frieze of the Doric order, between the triglyphs—generally ornamented with figures, or bulls' heads, or pateræ.

**METRA**, an ingenious pocket-instrument, invented by Mr Herbert Mackworth, about 1858. It combines the thermometer, clinometer, goniometer, anemometer, level, plummet, scales, &c., so that, by its assistance, travellers or engineers can at once record their observations. It enables us to determine the dip of rocks, angles of crystals, temperature, rate of wind, to take levels of large surfaces, determine latitude, and a variety of other matters connected with physical science. As a pocket-instrument, it is of great value.

**METRE** (Gr. *metre*) is that regulated succession of certain groups of syllables in which Poetry (q. v.) is usually written. A greater or less number of groups forms a *line* or *verse* (Lat. a turning), and in modern languages, the verses usually rhyme with one another; although this is not at all essential to the notion of metre. See **RHYME**, **BLANK VERSE**. In the classic languages, metre depended upon the way in which long and short syllables were made to succeed one another. English metre depends, not upon the distinction of long and short, but upon that of *accented* and *unaccented* syllables. Thus, in the lines,

The cu'r'few to'ls | the kne'll | of pa'r't'ing da'y—  
Wa'rriors and | ch'iefs, should the | sha'ft or the | swo'rd—

the accents occur at regular intervals; and the groups of syllables thus formed constitute each a metre, or measure. The groups of long and short syllables composing the metres of classic verse, were called *feet*, each foot having a distinctive name. The same names are sometimes applied to English measures, an accented syllable in English being held to be equivalent to a long syllable in Latin or Greek, and an unaccented syllable to a short.

Every metre in English contains one accented syllable, and either one or two unaccented syllables. As the accent may be on the first, second, or third syllable of the group, there thus arise five distinct measures, two dissyllabic and three trisyllabic, as seen in the words—1, fo'lly (corresponding to the classic Trochee); 2, reca'll (Iambus); 3, te'rribly (Dactyle); 4, confu'sion (Amphibrachys); 5, absen'tee' (Anapaest).

These measures are arranged in *lines* or *verses*, varying in length in different pieces, and often in the same piece. The ending measure of a line is frequently incomplete, or has a supernumerary syllable; and sometimes one measure is substituted for another. All that is necessary is, that some one measure be so predominant as to give a character to the verse. Constant recurrence of the same measure produces monotony. The following lines exemplify the five measures:

*1st Measure.*

Ri'ch the—treas'ure.  
Be'tter | ai'xty | yea'rs of | Eu'rope | tha'n a | cy'cle | of Ca | tha'y.

*2d Measure.*

Alo'ft | in a'w | ful sta'te.  
The pro'pler stu'd | y of | manki'nd | is ma'n.

*3d Measure.*

Bi'rd of the | wi'derness.  
Wa'rriors and | ch'iefs, should the | sha'ft or the | swo'rd.

## 4th Measure.

The de'w of | the mo'ring.  
O you'ng Loch|inva'r has | come ou't of | the we'st.

## 5th Measure.

As they ro'ar | on the sho'ro.  
The Assy'r | ian came do'wn | like a wo'lf | on the fo'ld.

It is instinctively felt that some of these measures are better suited for particular subjects than others. Thus, the first has a brisk, abrupt, energetic character, agreeing well with lively and gay subjects, and also with the intense feeling of such pieces as "Scots, wha ha'e." The second is by far the most usual metre in English poetry; it occurs, in fact, most frequently in the ordinary prose-movement of the language. It is smooth, graceful, and stately; readily adapting itself to easy narrative, and the expression of the gentler feelings, or to the treatment of severe and sublime subjects. The trisyllabic metres, owing to the number of unaccented syllables in them, are rapid in their movement, and calculated to express rushing, bounding, impetuous feelings. They are all less regular than the disyllabic metres. One of them is frequently substituted for another, as in the opening of Byron's "Bride of Abydos:"

Know' ye the | la'nd where the | cy'press and | my'rtil  
Are e'mblems | of dee'ds that | are do'ne in | their cl'ime;  
Where the ra'ge | of the vu'l | ture, the lo've | of the tu'r | tle—

where each of the three lines is in a different metre. In addition to this irregularity, one of the unaccented syllables is often wanting. For instance, in Mrs Hemans's poem, "The Voice of Spring:"

I co'me, | I co'me ! | ye have ca'll'd | me lo'ng;  
I co'me | o'er the mou'n | tains with li'ght | and so'ng—

the first line has only one measure of three syllables, although the general character of the versification is trisyllabic.

In a kind of verse introduced by Coleridge, and used occasionally by Byron and others, the unaccented syllables are altogether left out of account, and the versification is made to depend upon having a regular number of accents in the line:

There i's not wi'nd enou'gh to twi'rl  
The o'ne red le'af, the la'st of its cla'n,  
That da'n'ces as o'ften as da'n'ce it ca'n  
On the to'pmost twi'g that looks up at the sky'.

Here there are four accents in each line, but the number of syllables varies from eight to eleven.

To scan a line or group of lines, is to divide it into the measures of which it is composed.

The variety of combinations of metres and rhymes that may be formed, is endless; but a few of the more usual forms of English versification have received special names, and these we may briefly notice.

*Octosyllabics* are verses made up each of four measures of the second kind of metre, and therefore containing eight (*octo*) syllables:

With fru'it | less la' | bor, Cla' | ra bon'nd  
And stro've | to sta'nch | the gu'sh | ing wo'und.

Scott's poems are mostly in octosyllabics, and so is "Hudibras," and many other pieces.

*Heroic* is a term applied to verses containing *five* metres of the second kind, or ten syllables. Heroics either rhyme in couplets, or are without rhymes, constituting blank verse. Many of the chief narrative and didactic poems in the English language are in rhyming heroics; as those of Chaucer, Dryden, Pope, Cowper, &c. Milton's two great poems, Young's "Night Thoughts," Thomson's "Seasons," Cowper's "Task," Wordsworth's "Excursion," and many others, are written in

**Metre**  
**Metternich**

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blank heroics. Metrical dramas are almost always in blank verse; in which case there is frequently a supernumerary syllable, or even two, at the end of the line:

To be, | or not | to be, | that is | the ques | tion:  
Whether | 'tis no | bier in | the mind | to suf | fer.

In *Elegiacs*, the lines are of the same length and the same measure as in heroics; but the rhymes are alternate, and divide the poem into quatrains or stanzas of four lines, as in Gray's "Elegy." The Spenserian stanza, popularised by Spenser in the "Fairy Queen," and much used by Byron, differs from common heroics only in the arrangement of the rhymes, and in concluding with an Alexandrine (q. v.).

*Service metre*, also called *common metre*, is the form of versification adopted in the metrical Psalms, in many hymns, and other lyrical pieces. From being frequently employed in ballads, this metre is also called *ballad metre*. The first and third lines often rhyme, as well as the second and fourth.

Such are some of the more usual and definite forms of versification. In many poems, especially the more recent ones, so much licence is assumed, that it is difficult to trace any regular recurrence or other law determining the changes of metre, or the lengths of the lines; the poet seeks to suit the modulation at every turn to the varying sentiments. But it may be questioned whether much of this refinement of art is not thrown away, upon ordinary readers at least, who, failing to perceive any special suitableness, are inclined to look upon those violent departures from accustomed regularity as the results of caprice.

The kind of verse called *Hexameter* is described under its own name.

**METRE**, the basis of the "metrical" or modern French system of weights and measures, and the unit of length. The first suggestion of a change in the previous system dates as far back as the time of Philippe le Bel; but up till 1790, no important change had been effected. On the 8th May 1790, proposals were made by the French government to the British, for the meeting of an equal number of members from the Academy of Sciences and the Royal Society of London, to determine the length of the simple pendulum vibrating seconds in lat. 45° at the level of the sea, with the view of making this the unit of a new system of measures. The British government, however, did not give this proposal a favorable reception, and it fell to the ground. The French government, impatient to effect a reform, obtained the appointment by the Academy of Sciences of a commission composed of Borda, Lagrauge, Laplace, Monge, and Condorcet, to choose from the following three, the length of the pendulum, of the fourth part of the equator, and of the fourth part of the meridian, the one best fitted for their purpose. The commission decided in favor of the last—resolving that the 1-10,000,000th of a quadrant of the meridian (the distance from the equator to the pole, measured as along the surface of still water) be taken for the basis of the new system, and be called a "metre." Delambre and Mechain were immediately charged with the measurement of the meridian between Dunkerque and Barcelona; and the result of their labors was referred to a committee of twenty members, nine of whom were French, the rest having been deputed by the governments of Holland, Savoy, Denmark, Spain, Tuscany, and the Roman, Cisalpine, Ligurian, and Helvetic republics. By this committee, the length of the metre was found to be 443·296 Parisian lines, or 89·3707904 English inches; and standards of it and of the kilogramme, (see **GRAMME**) were constructed, and deposited among the archives of France, where they still remain. The "metrical system" received legal sanction 2d November 1801. The following are the multiples and fractions of the metre which are in common use, expressed in English measure:

	English Inches.		English Feet.	English Yards.
Millimètre,	·0893707904			
Centimètre,	·893707904			
Decimètre,	8·93707904			
<b>METRE,</b>	89·3707904	=	8·2808392	= 1·093633
Decamètre,	893·707904	=	82·848992	= 10·93633
Hectomètre,	8937·07904	=	828·08992	= 109·3633
Kilomètre,	89370·7904	=	8280·8992	= 1093·633
Myriamètre,	893707·904	=	82808·992	= 10936·33

From the metre, the other principal units of measure and weight are at once derived. See **ARE**, **LITRE**, **GRAMME**, **FRANC**.

**METRONOME**, a valuable small machine for indicating the correct time or speed at which a musical composition should be played. It was invented in 1815 by Mälzel, the inventor also of the automaton trumpeter. See **AUTOMATON**. The test of a correct metronome is, that when set at 60 it shall beat seconds.

**METROPOLIS LOCAL MANAGEMENT ACT**. The metropolis of the United Kingdom, owing to its immense size, has been regulated for sedile and sanitary purposes chiefly by special acts, one of which is called the Metropolis Local Management Act. It had long been subject to a special Building Act, which laid down minute regulations as to the formation of streets, alteration and building of houses; and the Metropolis Buildings Act still contains a code applicable to building regulations, the chief principle of which is, that no person can build or make alterations till they have been duly approved by the inspectors, whose duty it is to see that certain conditions have been complied with as regards the public safety. In 1855, a great change was made in the internal economy of the metropolis, by the Metropolis Local Management Act, which created the Metropolitan Board of Works, and provided it with extensive powers of drainage, sewerage, lighting, cleaning, removing nuisances, and general improvements, and with powers also to rate the occupiers of houses for the expenses of the general management. Formerly, each vestry did what it thought proper within its own parish, and there was no uniformity observed in the details of management. But the above act contained a code of laws affecting numerous details of street and city life. One important function was the systematic construction of sewers and the removal of nuisances. No new building is now allowed to be built without sufficient drains and water-closets. Paving is enforced in most cases.

**METROPOLITAN**. In Church Law, the bishop of a *metropolis*, or "mother city," upon which other episcopal cities are in some sense dependent. The gradations of the hierarchy, on which this dependence is founded, are of very early origin, and may, it is alleged, be traced, at least in germ, in the letters of St Paul to Timothy and to Titus. The commentaries of the Fathers (as Chrysostom, 15 "Hom. in 1 Tim.," and Eusebius, "Hist. Eccles." 1. iii. c. iv.) recognise it as of apostolic institution. The jurisdiction of metropolitans, according to the ancient law of the church, was very considerable, and extended over all the bishops of that province of which the metropolitan see was the capital. It was their privilege not only to summon and preside over provincial councils, to consecrate the provincial bishops, but also to decide certain causes, and in other ways to exercise authority within the sees of their suffragans. Recent canons have very much restricted their powers. The metropolitan is distinguished from an ordinary archbishop by his having suffragan bishops subject to him, which is not necessarily the case of an archbishop.

In the Church of England, the archbishops of Canterbury and York are metropolitans, and in the Protestant Episcopal Church of Ireland, those of Armagh and Dublin. In the newly-constituted hierarchy of the Roman Catholic Church in England, the Archbishop of Westminster has the rank of metropolitan. In the Roman Catholic Church of Ireland, the Archbishops of Armagh, Dublin, Cashel, and Tuam all possess the same rank.

**METTERNICH**, Clemens Wenzel Nepomuk Lothar, Prince von Metternich, and Duke of Pontella, an eminent Austrian diplomatist and statesman, born at Coblenz, 15th May 1773. His father, Franz Georg Karl, Count von Metternich, was also an Austrian diplomatist, and an associate of Kaunitz. He represented a very ancient and distinguished family, whose original seat was in Jülich. Young M. was educated at the university of Strasburg, and afterwards studied law at Mainz and travelled in England. In 1795, he married the grand-daughter and heiress of the celebrated minister Kaunitz, by whom he acquired large estates. His diplomatic career commenced at the congress of Rastadt, which he attended as representative of the Westphalian counts. His rise was very rapid; he added to the advantages of his birth and connections, a more than ordinary share of diplomatic ability, with the most graceful and winning manners. In 1801, he became Austrian ambassador at Dresden; and on the outbreaking of the third coalition war, he negotiated the treaty of alliance between Austria, Prussia, and Russia. In 1806, he went as ambassador to Paris, and concluded, in 1807, the treaty of Fontainebleau, very favorable to the in-

Mettray  
Meuse

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terests of Austria; but on the outbreaking of the war between France and Austria in 1809, he was detained some time ere he could obtain his passport. In course of that year, he succeeded Count Von Stadion as Minister of Foreign Affairs, concluded the treaty of peace with the French minister Champagny, and accompanied the Empress Maria Louisa to Paris. He guided the course of Austria amidst the difficulties of 1812-1813. He maintained at first a temporising policy and a scheme of an armed mediation of Austria; but the obstinacy of Napoleon reduced him to the necessity of adopting at last a decided step, and led him to resolve upon that declaration of war by Austria against France, which took place in August 1813, and he subsequently conducted with great ability the negotiations which ended in the completion of the quadruple alliance. On the eve of the battle of Leipzig, the emperor of Austria bestowed upon him the princely dignity. He was afterwards employed in almost all the chief diplomatic affairs of that eventful time; and after the congress of Chatillon and negotiations with the Count d'Artois, he went to Paris, and signed the convention of Fontainebleau with Napoleon, went to England to negotiate concerning a new quadruple alliance, and attended the congress of Vienna, of which he was unanimously elected president. He signed, as Austrian plenipotentiary, the second peace of Paris, 20th November 1815. After this, he continued still to conduct the diplomacy of Austria, and in 1831 was appointed chancellor (*Haus-, Hof- und Staatskanzler*), and in 1836 succeeded Count Zichy in the presidency of ministerial conferences on home affairs. His efforts were now earnestly directed to the maintenance of peace in Europe, and the preservation of the existing state of things in the Austrian dominions by the strictest measures of police and severe despotism. The revolutionary movement of 1848 breaking forth with sudden violence, caused the aged minister to flee from Austria, and to seek refuge in England; nor did he return to Vienna till the end of 1851, when he received great marks of honor and favor from the emperor; but although sometimes consulted, he was never again asked to undertake the cares of office. He died at Vienna, 11th June 1859. The general opinion respecting M. has been well expressed by the "Times" newspaper: "He was renowned rather than great, clever rather than wise, venerated more for his age than his power, admired but not lamented." His son Richard became ambassador at the Court of Napoleon III., after the peace of Villafranca.

**METTRAY.** The Reformatory of M. is the true parent of all institutions intended to reform and restore to society, and not merely to punish, juvenile delinquents. M. Demetz, a member of the Parisian bar, struck with the evils and hardship attending the commitment to prison of young, and, considering their training and habits, scarcely responsible criminals, there to languish hopelessly for a time, and then to emerge worse than when they entered, resolved, in conjunction with the Vicomte Bretignères de Courteilles, to found a school which should have for its object the reformation of this class of offenders. In 1839, accordingly, the Reformatory, or, as it is called, the Colony of Mettray, was set on foot, about five miles from the city of Tours in France. Thms M. Demetz, by his assiduous labors and self-devotedness, rendered to France and Europe one of the greatest benefits that could be conferred on society, by proving that, by agricultural and other labors of industry, and well-considered rules of organisation and discipline, the neglected and criminal may be trained to take their place honestly and honorably in society. The children consist wholly of orphans, foundlings, and delinquents, and, in 1872, amounted in number to 792. From the foundation up to that date, 4287 had been received. The relapses into crime of those who had left the colony amounted only to about 4 per cent. The success of this establishment is to be attributed not solely to the excellent training and close supervision at M. itself, but to the care which is taken to preserve the link between the authorities and those who have left the colony. A small payment is made by the state for children sent under judicial sentence; the large extra expenditure necessarily incurred being defrayed from charitable contributions from the individuals constituting the "Paternal Society of Mettray."

**METZ,** the strongest fortress of the German imperial territory of Alsace-Lorraine, and capital of the district of Lorraine; before 1871, the main bulwark of France in her north-eastern frontier and capital of the department of Moselle. It is situated on the Moselle at its confluence with the Sella. The strength of M. con-

sists in its exterior defences, of which the principal are eleven forts, partly strengthened and improved since the German occupation, and partly entirely new. The city contains many important institutions, barracks, hospital, military schools and arsenals. The cathedral, a Gothic edifice, begun in 1014, and finished in 1546, is remarkable for its boldness, lightness, and elegance, and has a beautiful spire of open work, 273 feet in height. The industry of M. is active; there is a good trade in wine, brandy, indigo, glass; and there are several cloth manufactories in the neighborhood. The pop. of M., which in 1869 was 49,325, had in 1875, by reason of emigration into France, decreased to 37,925, or with garrison, 45,556.

M., known to the Romans as *Divodurum*, was afterwards called Mettis (corrupted from *Mediomatrici*, the name of the people), and hence the present form. Under the Franks, M. was the capital of Austrasia (q. v.). At the division of Charlemagne's empire, M., with the rest of Lorraine (q. v.), fell to Germany and was afterwards made a free city of the Empire. In 1552, it was treacherously taken possession of by the French; and although Charles V. besieged the place from October 1552 to January 1553, they kept it till it was formally ceded to them in 1648. In August 1870, Bazaine was compelled to retire into M. with his army; and after an investment of 70 days, during which no attempt was made to take the city by force (not even a single shell having been fired into it), Enrope was startled to hear of the capitulation of M., by which 180,000 men and immense military stores fell into German hands (27th October 1870). By the treaty of Frankfurt, M. was annexed to Germany as part of Lorraine.

MEUDON, a town of France, in the dep. of Seine-et-Oise, 5 miles west of Paris, on the Versailles and Paris Railway. The *château*, approached by a fine avenue of four rows of lime-trees, was built by the side of an older *château*, the work of Phillibert Delorme, by the Grand Dauphin, son of Louis XIV., in 1699. During the Revolution, it was converted into a factory for warlike engines, and surrounded with a permanent camp, to keep out spies. The *château*, as it exists at present, was fitted up for Marie Louise by Napoleon, in 1812. It has a fine terrace, gardens beautifully laid out, and commands a very fine prospect. The Forêt de Meudon is a favorite holiday resort of the Parisians. Near it has been erected an expiatory chapel, dedicated to Notre Dame des Flammes, marking the spot where a terrible railway accident occurred in May 1842, in which more than 100 persons were burned alive. Whiting is manufactured to a considerable extent, and there are numerous beach-fields. Rabelais was curé of M. for a long time. The *château* was for many years a favorite summer residence of Prince Napoleon. Pop. (1876) 6385.

MEU'LEBEKE, a town of Belgium, in the province of West Flanders, 20 miles south-west of Ghent, on the Mandel, a tributary of the Lys. Weaving is carried on, and there are several breweries. It is near a railway, which connects it with Bruges and other places. Pop. 8,300.

MEURTHE, formerly a department in the north-east of France, immediately south of the former department of Moselle. The area was about 2254 sq. miles; pop. in 1866, 428,387. Its surface is undulating and picturesque; while along the eastern border run the Vosges Mountains, rising in one point to 1148 feet in height. The chief rivers are the Moselle, and its affluents the Meurthe, the Madon, the Sèille, &c. This district is no less remarkable for the beauty of its scenery, than for the fertility of its soil and the variety of its productions. After the treaty of Frankfurt, by which part of M. was ceded to Germany, the rest of M., together with the small part of the department of Moselle that remained to France, was formed into a new department under the name MEURTHE-ET-MOSELLE; area, 2015 sq. miles; pop. (1876) 404,600. Arrondissements: Nancy, Lunéville, Toul (from M.), and Briey (from Moselle); capital, Nancy.

MEUSE, a frontier department in the north-east of France. Area, 2400 sq. miles; pop. (1876) 294,054. The surface is traversed from south-east to north-west by two parallel ranges of hills, which form the right and left bank of the river Meuse (see MAAS), and separate it from the basin of the Seine on the west, and from that of the Moselle on the east. The Meuse, the Ornain, and the Aire, are the chief rivers. The soil is generally poor, except in the valleys of the principal rivers, which are remarkably fertile and well cultivated. The usual crops are raised in average quantities. 22,000,000 gallons of wine (red and white) are made annually.



The four arrondissements are Bar-le-Duc, Commercy, Montmédy, and Verdun. The capital is Bar-le-Duc.

MEXICO constitutes the south-west extremity of North America, and occupies a portion of the isthmus which connects the latter with the south part of the American continent. It is bounded on the n. by the territories of the United States, on the w. by the Pacific Ocean, on the s. by the Pacific and Central America, and on the e. by the Gulf of Mexico. The area of M. is about 750,000 square miles, and the pop. (1878) about 9,840,000. In 1861, the 8,000,000 inhabitants were thus distributed amongst the various races: Indians, 4,800,000; whites, 1,004,000; half-breeds, 1,190,000; negroes, 6000. The following table gives the names of the provinces and their chief towns, with the populations for 1869:

States.	Pop. in 1869.	Chief Towns.	Population.
Agua Calientes.....	140,630	Agua Calientes.....	22,534
Campeachy.....	80,366	Campeachy.....	15,196
Chiapas.....	193,187	San Cristobal.....	10,475
Chihuahua.....	179,971	Chihuahua.....	12,000
Cochilla.....	95,397	Saltillo.....	8,106
Colima.....	68,333	Colima.....	31,000
Durango.....	185,077	Durango.....	12,419
Guanajuato.....	874,043	Guanajuato.....	62,000
Guerrero.....	300,929	Tixtla.....	6,501
Hidalgo.....	404,207	Pachuca.....	13,000
Idaleco.....	924,580	Guadalajara.....	70,000
Mexico.....	653,688	Toluca.....	12,000
Michoacan.....	618,240	Morelia.....	26,000
Morelos.....	150,384	Cuernavaca.....	.....
Nuevo Leon.....	174,000	Monterey.....	13,500
Oajaca.....	646,725	Oajaca.....	25,000
Puebla.....	697,788	Puebla.....	75,500
Queretaro.....	163,286	Queretaro.....	47,670
San Luis Potosi.....	476,500	San Luis Potosi.....	33,531
Sinaloa.....	163,096	Cullacan.....	10,000
Sonora.....	109,388	Ures.....	7,000
Tlaxasco.....	83,707	San Juan Bautista.....	6,000
Tamaulipas.....	108,778	Ciudad Victoria.....	6,164
Tlaxcala.....	121,665	Tlaxcala.....	4,000
Vera Cruz.....	459,262	Vera Cruz.....	10,000
Yucatan.....	422,365	Merida.....	23,500
Zacatecas.....	397,945	Zacatecas.....	31,000
Federal District.....	275,996	Mexico.....	200,000
California.....	21,645	La Paz.....	500

*Physical Character, &c.*—The great mass of the Mexican territory consists of an elevated plateau, formed by an expansion of the Cordilleras of Central America (q. v.), from which terraced slopes descend with a more or less rapid inclination towards the Atlantic on the east, and the Pacific on the west. This vast tract, which extends from 18° to 32° n. lat., and from 95° to 115° w. long, comprises one of the richest and most varied zones in the world; for while its geographical position secures to it a tropical vegetation, the rapid differences of elevation which characterise it, afford it the advantages of temperate climates, in which all the varieties of our European flora and fauna can come to perfection; and it thus combines within its limits an almost unparalleled exuberance and multiplicity of natural products. The table-lands of M. lie at elevations varying from 5000 to more than 9000 feet above the level of the sea, and exhibit great differences of level and varieties of soil. They generally incline northward, and are for the most part girt in by low mountain chains, among which rise individual lofty peaks, as Cofre de Perote (13,400 feet), Orizava (17,370 feet), and others; while they are intersected by higher ranges, above which tower a few cones, as Iztaccihuatl, the White Woman (15,700

feet), and the volcano of Popocatepetl, or the Smoking Mountain (17,880 feet). These volcanoes and several others of less note, lying within the parallels of  $18^{\circ} 15'$  and  $19^{\circ} 30'$  n. lat., form a transverse volcanic band between the two oceans, and do not follow the inclination of the central chain, as is the case in the volcanoes of South America. Volcanoes also occur isolated, as, for instance, in the plain of Mixtcapan, 2900 feet above the sea, where, in 1719, the volcano of Jorullo, which still emits smoke, was formed after an eruption by which a surface of many square miles was raised several feet above the level of the plain; in fact, every part of the Mexican territory betrays the volcanic nature of its formation, although neither earthquakes nor any other active phenomena have of late been of frequent occurrence. The principal chain, intersecting the table-land, is the Sierra Madre, or Tepe Suene, in which lie the chief gold and silver mines, and which, after traversing the states of Queretaro and Guanajuato, divides into three main branches, the central of which forms the water-shed between the Pacific Ocean and the Gulf of Mexico. In addition to these great chains, the Mexican territory is intersected by numerous lesser ranges, which on the Pacific side break up the terraced declivities into innumerable deeply-cleft valleys, which assume almost the character of steep ravines near their junction with the narrow littoral plains of the Pacific Ocean. Violent storms rage on this coast, blowing from the south-west during the hot months, when the climate is as prejudicial to whites as on the Mexican Gulf, although it is not visited by the yellow fever. M. may be said to be generally deficient in navigable rivers; for although some of the largest have a course of more than 1000 miles, few are free from rapids. The Rio Santiago, or Rio Grande, with a course of 500 miles, is broken near Guadalajara by 60 falls in the space of less than three miles; the Rio Grande del Norte, which forms in its lower courses the boundary between M. and the United States, has a winding course of nearly 1800 miles, but it is only navigable for small sailing-vessels to Matamoras, 60 miles from its mouth, where a bar and numerous shoals prevent the passage of large vessels. A similar remark applies to the majority of the rivers which fall into the Gulf of Mexico. The eastern coast generally presents great obstacles to navigation, as it is low and sandy, unbroken by bays or inlets, and lined by sandbanks several miles in width; the only points of access being the mouths of rivers, which are not good roadsteads, as, with few exceptions, the rivers have little water, except at the rainy season, which generally sets in about June, accompanied by overpowering heat, during the prevalence of which the yellow fever, or *comito prieto*, rages like a pest in all the low lands. M. is on the whole badly supplied with water; and since the Spaniards have discontinued the system of irrigation, which was followed by the Aztec races with so much success, many tracts have become barren, and unsuited for the purposes of human occupation. A great portion of the table-lands can only be used for pasture. Springs are rare, and many of the rivers flow in deep mountain-beds, without receiving smaller tributaries, while the rapid evaporation on a light soil, covering porous rocks, leaves the surface dry and hot, and unable to support any vegetation beyond the cactus and some low grasses. The plains, moreover, contain the beds of numerous dry salt lakes, but this is chiefly the case on the north and east of the table-land. The western parts of the plateaux between  $100^{\circ}$  and  $102^{\circ}$  w. long. (known as the Baxio) yield, by careful irrigation, rich crops of maize and wheat, and rank among the most fertile agricultural districts of Mexico. They are, however, here and there interrupted by sterile tracts, either covered by stones, and then known as "pedregal," or with lava, when they are characterised as a *mal país* (bad country). In contrast with these unprofitable districts, the plains are occasionally broken by depressions of the soil, known as *Barrancas*, descending sometimes 1000 feet, and measuring several miles across, which are covered with a luxuriant vegetation of trees and shrubs, and watered by small streams running through the middle of the valley. M. has numerous lakes, but few of any importance; that of Chapala in Jalisco is one of the most considerable, being more than 90 miles long.

*Climate, Products.*—The differences of climate, depending upon the different degrees of altitude, are so great in M., that the vegetable products of this vast country include almost all that are to be found between the equator and the polar circle. In the course of a few hours, the traveller may experience every gradation of climate,

embracing torrid heat and glacial cold, and pass through different zones of vegetation, including wheat and the sugar-cane, the ash and the palm, apples, olives, and guavas. The Spaniards, on their first occupation of M., distinguished its great climatic divisions under the characteristic names, which are still retained, of the *Tierras Calientes* (hot or littoral lands), *Tierras Templadas* (temperate lands), and *Tierras Frias* (cold or high lands). The mean annual heat of the *Tierras Calientes* is 77°; and the soil, which is generally fertile, produces maize, rice where water can be procured for irrigation, bananas, pine-apples, oranges, manioc; and sarsaparilla, jalap, and vanilla in the littoral swampy forests. This tract has only two seasons—the winter, or season of north winds, and the summer, or season of breezes. In the former, the hurricanes are the terror of navigators, but the coast is clear of yellow fever, which prevails in the hot season. On the medium elevations of the *Tierras Templadas*, the temperature is extremely equable, varying only from about 70° to 80° F.; the climate healthy, and wherever water is abundant, a perpetual summer reigns, yielding a varied and active vegetation, which embraces all the cereals, fruits, and vegetables of Central and Southern Europe, amongst which maize, oranges, lemons, grapes, and olives are produced in the most exuberant abundance. The *Tierras Frias*, which would scarcely have been characterised as cold by discoverers belonging to a less southern climate than Spain, possess a generally temperate climate, the mean annual heat ranging between 66° and 68° F.; but on the highest of the table-lands, the air is keener, and the soil more arid, and agriculture is limited to the cultivation of barley and of the agave, or Mexican aloe, which held the place of the vine among the ancient Aztecs, and is still extensively cultivated for the sake of its juice, which is made into the fermented drink known under the name of *pulque*. In addition to the vegetable products already referred to, M. yields coffee, tobacco—whose growth is, however, limited by governmental restrictions—yams, capsicums, pepper, pimento, indigo, ipecacuanha, dragon's-blood, copaiba, fan-palms, india-rubber trees, mahogany, rosewood, ebony, &c.

The products of the mines, which rank among the richest in the world, include the precious metals. The gold-mines of M. occur principally on the west side of the Sierra Madre, north of 24° n. lat., and, until the discovery of the metal in Australia, their yield surpassed the produce of any other part of the world. Silver mines abound in M., and the argentiferous veins, which may be said to intersect every part of the western declivities of the Andes, occur in some places, as in the *Veta Madre* lode at Guanajuato, in beds varying from 10 to 50 yards in depth; the precious metal being in these cases intermixed with sulphur compounds, antimony, and arsenic. But although these mines possess the additional special advantage of being situated in fertile districts, affording abundant food to miners and their cattle, their working has been very imperfectly carried on, owing to the unsettled state of the country. At the close of the last, and the beginning of the present century, the annual value of the gold and silver of M. was upwards of £8,000,000, of which 9-10ths were yielded by the silver; but the political disturbances, preceding and consequent on the wars of independence, have very considerably reduced this sum, which has probably never been reached since M. was finally separated from the mother-country. In addition to gold and silver, M. yields tin, antimony, mercury, copper, lead, iron, and zinc; while carbonate of soda, used in smelting silver, is found crystallised on the surface of several lakes, and occurs, together with common salt, in dry seasons, on the more arid parts of the surface of the elevated table-lands.

Cattle, horses, asses, mules, and sheep abound in M., where, in consequence of the extent and excellence of the pasture-grounds, all the domestic animals introduced from the Old World have multiplied excessively. Buffaloes feed in the lower plains; goats and sheep are plentiful; the tapir, wolf, American lynx, jaguar, wild-cat, several species of the skunk, the brown porcupine, stag, deer, &c., are to be found. Parrots, humming-birds, and wild game birds, including turkeys, are abundant; and almost all the lakes yield large quantities of fish. The cochineal insect and the silk-worm are reared with great success on the table-land of Mixtecapan.

*Commerce, &c.*—Notwithstanding the enormous advantages presented by her natural productions, and the important geographical position which she occupies between the Atlantic and the Pacific, M., owing to her unsettled government, and the consequent insecurity of life and property, has not been able to develop her

foreign commerce beyond the value of about 10 millions sterling. The precious metals constitute, it is estimated, nearly nine-tenths of the exports, the remainder being made up by productions of the soil, and industrial products, such as cotton, woollen, and silk goods, soap, leather, saddlery, gold and silver lace, cigars, brandy, &c. England, France, Hamburg and Lübeck, and the United States of America are the principal powers with which M. maintains relations of foreign commerce; while the city of Mexico is the chief focus of internal trade, and Vera Cruz the principal port for maritime commerce. The total value of the foreign trade of M. in 1853 was—for imports, £5,600,000; for exports, £5,100,000. For the number of ships entering and clearing the ports of M., see **VERA CRUZ** and **TAMPICO**. M. possesses about 400 miles of railway, the line from Vera Cruz to Mexico being one of the most wonderful pieces of engineering enterprise in the world. The annual traffic amounts to about 250,000 passengers, and 190,000 tons of freight. The financial condition of M. has been allowed to fall into such disorder since the establishment of independence, that the expenditure has been continually increasing beyond the receipts. According to the printed estimates, the estimated amount of the budget for 1855-6 was £4,760,000. The total expenditure for the same year was estimated at £4,950,000. The revenue is derived mainly from the customs. The total amount of the national debt cannot be stated. The loans contracted by the imperial government are entirely repudiated by the present government.

**Army, Navy, &c.**—In accordance with the old constitution of M., the standing army was to consist of 26,000 men, with a reserve of 65,000 men; but this number, which had fallen to nearly half the required force in 1855, has been so extensively reduced since that period by continual civil wars, that according to Spanish authorities, the government of the late President Juárez, on the breaking out of hostilities with the French in 1862, was unable to bring into the field more than 5000 infantry, 600 cavalry, and 9500 of the national guard. The total strength of the army is now estimated at about 20,000 men. The navy consisted of only some 300 men, while the fleet numbered only 9 small ships of war, carrying in all between 30 and 40 cannon. Education in M., long in the lowest possible condition, even among the wealthier classes, is now steadily improving. Liberal allowances have been made by the central and state governments for establishment of new schools, &c. In 1853 there were in M. nearly 4000 public schools, with about 190,000 scholars.

**Religion, &c.**—The Roman Catholic is the dominant church of M., but all other sects are tolerated. M. has 3 archbishops and 10 bishops. The administration of justice is not what it should be, but is not so inefficient, nor the courts so corrupt, as formerly. Brigandage and smuggling endanger personal security, and seriously damage the resources of the nation, but are gradually disappearing.

The supreme power of the state was, in 1858, vested in the hands of Benito Juárez, who was to bear the title of Constitutional President and administer public affairs in conjunction with a legislative congress, composed of a chamber of senators and a lower house of representatives. Each province was to elect two senators and one deputy to every 40,000 inhabitants, and was, moreover, to have a separate provincial legislative chamber, presided over by its governor. President Juárez is undoubtedly, along with General Iturbide, to be regarded as the most distinguished character in modern Mexico. The unfortunate Maximilian was a mere episode in the career of the country. A Provisional Regency of the Mexican Empire was appointed by the *Junta Superior del Gobierno*; which was itself constituted (16th June, 1863) by a decree of Marshal Forey, leader of the French army of invasion. It was composed of 85 members. This Junta at the same time established, under French influence, an *Assembly of Notables*, whom it charged with deciding in the name of the people what form of government M. should adopt. On the 10th of July 1863, this body, by an overwhelming majority, decided in favor of a constitutional hereditary monarchy, and that the new ruler should bear the title of Emperor of Mexico. See **MEXICO**. The present constitution dates from 1857. The executive power is vested in a president, elected by universal suffrage, for a period of 6 years. The legislative power is confided to a congress consisting of a House of Representatives (one for each 80,000 inhabitants), and a senate (with two members for each state).

**History of Mexico.**—The history of ancient M. exhibits two distinct and widely-differing periods, the former of which, that of the Toltecs, appears to have begun in

the 7th, and ended with the 12th c.; while the second, that of the Aztecs, began in the year 1200, and may be said to have been closed by the conquest of Cortes in 1519; for although the race has maintained occupation of the Mexican territory, its existence as a nation ceased with the Spanish domination. The origin and primitive seats of the Toltecs are shrouded in mystery; and all that we learn of this people is, that they came from the north, from some undefined locality, which they designated Tullan, and from whence they brought to the valley of Mexico the first elements of civilisation. Their laws and usages stamp them as a people of mild and peaceful instincts, industrious, active, and enterprising. They cultivated the land, introduced maize and cotton, made roads, erected monuments of colossal dimensions, and built temples and cities, whose ruins in various parts of New Spain still attest their skill in architecture, and sufficiently explain why the name Toltec should have passed into a synonym for architect. They knew how to fuse metals, cut and polish the hardest stones, fabricate earthenware, and weave various fabrics; they employed hieroglyphics for the record of events, were acquainted with the causes of eclipses, constructed sun-dials, devised a simple system of notation, and measured time by a solar year, composed of 18 months of 20 days each, adding 5 complementary days to make up the 365, and intercalating 12½ days at the expiration of every 5½ years, which brought them within an almost inappreciable fraction to the length of the tropical year, as established by the most accurate observations. These and other arts, with a mild form of religion, and a simple but just mode of administering the laws, the Toltecs bequeathed to the Aztecs, who engrafted upon the civilisation of their predecessors many fierce and sanguinary practices in their religions, and many puerile usages in their social life. Nothing is known of the exact time, and still less of the manner and causes of the departure of the Toltecs from M.; but it has been conjectured that they went towards the south, and that the colossal architectural remains of the cities of Palenque, Uxmal, and Mitla, in Central America, are the work of their hands. The Aztecs, as we have said, imparted to the institutions of the Toltecs a tinge of their own sombre cruelty, and produced an anomalous form of civilisation, which astonished the Spaniards by its mingled character of mildness and ferocity. Like the Toltecs and the Chichimeca, a rude tribe who had succeeded them, the Aztecs came from the north, and after wandering from place to place, founded in 1325 the city of Tenochtitlan, or Mexico. On the arrival of the Spaniards, their empire was found to extend from ocean to ocean, stretching on the Atlantic from 18° to 21° n. lat., and on the Pacific from 14° to 19° n. lat. Their government was an elective empire, the sovereign being selected from the brothers of the deceased prince, or, in default of them, from his nephews. Their laws were severe, but justice was administered in open courts, the proceedings of which were perpetuated by means of picture-written records.

The Aztecs believed in one supreme invisible creator of all things, the ruler of the universe, named *Taotli*—a belief, it is conjectured, not native to them, but derived from their predecessors, the Toltecs. Under this supreme being stood 13 chief and 200 inferior divinities, each of whom had his sacred day and festival. At their head was the patron god of the Aztecs, the frightful *Huitzilopochtli*, the Mexican *Mars*. His temples were the most splendid and imposing; in every city of the empire his altars were drenched with the blood of human sacrifice. Cortes and his companions (see *Drax*) were permitted by Montezuma to enter that in the city of Mexico, and to behold the god himself. "He had a broad face, wide mouth, and terrible eyes. He was covered with gold, pearls, and precious stones; and was girt about with golden serpents. . . . On his neck, a fitting ornament were the faces of men wrought in silver, and their hearts in gold. Close by were braziers with incense, and on the braziers three real hearts of men who had that day been sacrificed" (Helps' "Spanish Conquest in America," vol. II., book x., chap. 4). The smell of the place, we are told, was like that of a slaughter-house. To supply victims for these sacrifices, the emperors made war on all the neighboring and subsidiary states, or in case of revolt in any city of their dominions, and levied a certain number of men, women, and children by way of indemnity. The victims were borne in triumphal processions and to the sound of music, to the summit of the great temples, where the priests, in sight of assembled crowds, bound them to the sacrificial stone, and opening the breast, tore from it the bleeding heart, which was

either laid before the image of their gods, or eaten by the worshippers, after having been carefully cut up and mixed with maize. In the years immediately preceding the Spanish conquest, not less than 20,000 victims were annually immolated. These atrocities were incongruously blended with milder forms of worship, in which fruits, flowers, and perfumes were offered up amid joyous outbursts of song and dance. According to their mythology, Tzotl, who delighted in these purer sacrifices, had once reigned in Anahuac (a name which at first probably applied only to the country in the immediate vicinity of the capital, though afterwards it was applied to the whole Aztec empire) in the golden age of the world, but being obliged, from some unexplained cause, to retire from earth, he departed by way of the Mexican Gulf, promising to return. This tradition accelerated the success of the Spaniards, whose light skins and long dark hair and beards were regarded as evidences of their affinity with the long-looked-for divinity. The Mexican priesthood formed a rich and powerful order of the state, and were so numerous that Cortes found as many as 6000 attached to the great temple of Mexico. The education of the young of both sexes remained till the age of puberty in the hands of the priests and priestesses; and the sacerdotal class were thus able to exercise a widely diffused influence, which, under the later rulers, was almost equal to that of the emperor himself. The women shared in all the occupations of the men, and were taught, like them, the arts of reading, writing, ciphering, singing in chorus, dancing, &c., and even initiated in the secrets of astronomy and astrology.

On the arrival of Cortes, in 1519, the Aztec throne was occupied by Montezuma, an energetic prince, who, after his election to the throne, which for several generations had been occupied by his ancestors, made successful war on the powerful and highly-civilised neighboring state of Tlascala, and on Nicaragua and Honduras; after a time, however, he grew indolent, and alienated the affections of his subjects by his arrogance and exactions, and by his unremitting devotion to the services of the temples. According to the oracles which he frequently consulted, great changes were impending over the empire, the return of Quetzalcoatl was near at hand, and the fall of his race was impending. The tidings of the arrival on the coast of the expedition of Grigalva in 1518 terrified Montezuma and his priestly councillors; and when the hieroglyphic reports of his provincial officers announced the landing in the following year of Cortes and his companions, he endeavored to propitiate the dreaded strangers by sending an embassy charged with valuable gifts to meet them. The road to success was thus open to the Spanish captain, who, with a handful of men, advanced from St. Juan de Ulloa to M., and gradually subdued the entire empire of the Aztecs, whose power crumbled to dust before the greater energy and superior civilisation of their Christian invaders. In 1540, M. was united with other American territories under the name of New Spain, and governed by viceroys appointed by the mother-country. The intolerant spirit of the Catholic clergy led to the suppression of almost every trace of the ancient Aztec nationality and civilisation, while the strict system of sequestration enforced in M. crippled the resources of the colony; yet notwithstanding these drawbacks, M. ranked first among all the Spanish colonies in regard to population, material riches, and natural products. It may be said to have vegetated for nearly three centuries in a state of semi-quietude prosperity, interrupted by few disturbances of any kind until the year 1810, when the discontent, which had been gaining ground against the vice-regal power during the war of the mother-country with Napoleon, broke into open rebellion under the leadership of a country priest named Hidalgo. The defeat and subsequent execution of the latter in 1811 put a partial stop to the insurrection, but the atrocities committed under the sanction of the new viceroy, Calleja, exasperated the people, and gave an irresistible impulse to the revolutionary cause. Guerrero and Iturbide in turn gained signal advantages over the Spaniards. For a time, Iturbide maintained a self-established imperial rule over the colony; but on the downfall consequent on his tyrannical abuse of power, a constitutional mode of government was inaugurated, and in 1824 the independence of M., which had chosen a federal republican form of government, was finally established, and in the following year definitely recognised by every foreign power, except Spain. The Mexican war was stained with excesses and atrocities on both sides; but it must be confessed that the Spaniards gained an unenviable pre-eminence in regard to the wanton cruelty which characterised their method of

conducting hostilities. With them the war was one of extermination, every commander being allowed, at his own discretion, to hunt down and slaughter the insurgents like brutes. The welfare of the new republic was unhappily disturbed by constant outbreaks of civil war under the leadership of the *Escoscos*, or aristocratic faction, and the *Yorkinos*, or democrats; and the history of the quarter of a century during which M. has exercised independent power, leaves little to recount beyond ever-recurring acts of violence, and the rapid and summary deposition of one president after another. In 1836, Texas secured its independence of the Mexican republic, for which it had struggled for several years, and at the same period differences arose with France, which were, however, brought to a peaceful conclusion after the taking of Vera Cruz in 1838 by the French troops. In 1841, General Santa Anna, on the retirement of Bustamante, succeeded in regaining the direction of affairs, from which he had been more than once deposed, and under the title of Dictator, exercised the power of an autocratic ruler. In 1845, M. was compelled to recognise the independence of Texas, which was incorporated with the United States, whose troops having entered the Mexican territory, provoked a declaration of war on the part of the Mexican government. Hostilities were carried on with great energy by both parties until 1848, when peace was finally concluded, after several bloody engagements had been fought without any definite result on either side; and the city of Mexico had been stormed and taken by the Americans under General Scott. In 1852, after Santa Anna and Herrera had been in turn deposed and recalled to power, a revolutionary movement of more than ordinary importance brought General Cevallos for a time to the head of affairs; but, when the insubordination and arrogance of the soldiery threatened universal anarchy, Santa Anna was again recalled, 17th March 1853. Having reorganised the army, and suppressed by the most cruel severity the insurrection of the federals, he declared himself President for life, and thus again rekindled civil war. In 1855, he had to flee from the country. Since then, utter confusion has prevailed. Santa Anna was succeeded by General Alvarez, who held office for about two months, after whom came General Comonfort, who was forced to resign in 1858; when a General Zavago assumed supreme power, but was almost immediately deposed by a General Robles. This person also proving a futility, Benito Juarez was elected; but his claims were contested by General Miramon—the head of the priestly and conservative party—and the country was plunged in civil war. The acts of wanton aggression and flagrant injustice perpetrated on foreigners in M. during this period of internal disorder, during which the Cortes passed an act suspending all payments to foreigners for two years, could not fail to draw upon the Mexican government the serious remonstrance of those European powers whose subjects had just cause of complaint; and the result was to bring a fleet of English, French, and Spanish ships into the Mexican Gulf for the purpose of enforcing satisfaction. In December 1861, the British minister left M., and the Spaniards disembarked a force at Vera Cruz, and took possession of the fort of St Juan d'Ulloa, a step which was soon followed by the arrival before the former city of the allied fleet. A proclamation, signed by the commanders-in-chief of the three naval divisions, and addressed by them to the Mexican people, elicited no satisfactory reply; and steps were accordingly taken to advance at once upon the capital. This measure alarmed the provisional government of M., and brought about an armistice, with a view of negotiating a treaty for the future regulation of commercial intercourse between M. and the great European powers. This treaty was drawn up and provisionally ratified by the different commanders, but not confirmed on the part of France, and consequently the French troops retained occupation of the Mexican territory after the English and Spaniards had declined to join in further hostile demonstrations. In April 1862, the French emperor formally declared war against the government of Juarez, who had assumed arbitrary rule as president of the republic. The French, who spent £8,000,000 on the Mexican expedition, did not meet with the sympathy and welcome from the people at large which the assumed unpopularity of Juarez had led them to anticipate; and, although the taking of Puebla and other decided successes gave them a firmer footing in the country, it was evident that whatever grievances the Mexican nation had against their government, they entertained a deeply-rooted hatred against foreigners, and were certainly not prepared to welcome with cordial unanimity the thorough re-

organisation of their political system, which the European powers, with France at their head, were initiating for the country.

**MEXICO.** After the declaration of war against Juarez by the French, they issued a proclamation to the Mexican people, April 16, 1862, setting forth that one of the objects of the contest was to rescue them from the tyranny of the President, and put the government of the country on a stable footing. Little faith, however, seems to have been put in these professions; and the invaders, though joined by Marquez, the military leader of the clerical party, met with little success till the arrival of General Forey with a reinforcement from France in September. Forey then took the command in chief, addressed a proclamation to the Mexicans, promising them perfect liberty in the choice of a new government in room of that of Juarez; and in the spring of 1863, concentrated the French troops, and marched on Mexico. On his way, he took the strongly fortified city of Puebla after a two months' siege, capturing its defender, Ortega, and his whole force (May 18); and, Juarez having fled from the capital, and transferred the seat of his government to San Luis Potosí at their approach, the French entered Mexico on June 10. A fortnight afterwards, a provisional government, headed by General Almonte, was established, and an "Assembly of Notables," which was called (June 24) to deliberate upon the best form of government, decided in July, by a vote of 231 to 19, in favor of a "Limited Hereditary Monarchy," with a Catholic prince for sovereign, under the title of "Emperor of Mexico," and resolved in the first place to offer the crown to the Archduke Ferdinand Maximilian (q. v.) of Austria, failing whom, to request the good offices of the Emperor Napoleon in obtaining another monarch. That this resolution was the fruit of a general earnest wish on the part of the Mexican notables, the feeble and almost unwilling support most of them accorded to their chosen emperor after his desertion by the French, will not allow us to suppose; but, on the other hand, we have not the slightest reason for believing that anything approaching intimidation or undue influence was exercised by the French. Most of them doubtless argued that a government supported by France would be sufficiently powerful to maintain the country in a state of tranquillity, and in the hope of this long-wished-for result, cast in their lot for empire. These changes were, of course, vigorously protested against by the republican assembly at San Luis, and the two parties prepared with eagerness to try the fortune of war. On October 1, Forey departed from Mexico, and General Bazaine took the command of the French forces, and commenced the campaign with vigor. The result of the winter's struggle was that in spring the imperialists were in possession of the whole country, with the exception of the four northern provinces. October 3, 1863, the Archduke Maximilian had given audience at his château of Miramar, near Trieste, to a deputation which was sent to offer him the crown, and had accepted it. On May 22, the emperor and empress landed at Vera Cruz, and on June 12, made their public entry into the capital; and soon after the middle of the year, the imperialists had gained possession of every state in the kingdom, Juarez fleeing in August to the United States. As small parties of the republicans still maintained a species of guerrilla warfare in various districts, Maximilian, on October 2, 1865, published a proclamation, menacing with death, according to the laws of war, all who were found in armed opposition to his government; the republic having ceased, not only by the express wish of the nation, but also by the expiry (November 22, 1864) of Juarez's term of office, and his flight beyond the frontiers; the amnesty, however, being accorded to such as submitted before November 15. In accordance with this edict, Generals Arteaga and Salazar, who were defeated and captured, October 18, were shot on the 21st; and many hundreds of captured republicans were dealt with under the terms of the same order.

This contest in M. had from the commencement excited the liveliest interest in the United States, though the civil war, raging there also, prevented any active interference in the affairs of its neighbor. A general impression existed that France had taken advantage of the troubles of the United States to establish its authority firmly on the American continent; and this belief, along with the violation of the "Monroe doctrine" by the establishment of imperialism in M., induced the United States to give all their sympathy and diplomatic aid to Juarez and his supporters. In November 6, 1865, Secretary Seward forwarded a dispatch to Paris, in which it was stated that the presence of the French army in M. was a source of "grave re-



section" to the government of the United States, and that the latter could on no account allow the establishment of an imperial government, based on foreign aid, in M., or recognise in that country other than republican institutions. This dispatch led to an interchange of diplomatic notes during the following six months; the Americans holding firmly to their first statements, and even insinuating the probability of an armed interference on behalf of Juárez; till the French emperor, who was wearied with a contest so expensive and, though successful, so barren of lasting fruits, ultimately agreed, in the summer of 1866, to withdraw his troops from Mexico. The Belgian legion and some Austrian levies, however, were not included in this arrangement. Accordingly, from the autumn of 1866 till Feb. 1867, the French troops by degrees evacuated M., and their departure was the signal for a fresh rising on the part of the Juaristas. See **MAXIMILIAN** and **JUÁREZ**. The political condition of M. is still far from satisfactory.

**MEXICO** (City). Mexico, or Mejico, the capital of the republic, is situated in  $19^{\circ} 20'$  n. lat., and  $99^{\circ} 5'$  w. long., at an elevation of nearly 7500 feet above the level of the sea, in the valley of Tenochtitlan,  $2\frac{1}{2}$  miles west of Lake Tezcucó. The pop. was, in 1878, 230,000. This beautiful city, which is built on the site of the ancient Tenochtitlan of the Aztec empire, is situated on an extensive plateau, having an area of more than 1700 square miles, surrounded by lofty mountains, and including five lakes within its area. The principal streets, which all converge towards the great square of Mexico, are regularly and well laid-out, broad, clean, and well-paved and lighted; but the buildings, both private and public, are low, and of a light style of architecture, in consequence of water being found in many parts of the city at only a few feet below the surface, and partly from apprehension of earthquakes. The Plaza Mayor, one of the finest squares of the western world, contains the cathedral, a spacious and imposing building, erected on the ruins of the great *teocalli*, or temple of the Aztec god Mixtli, and adorned with the *kellenda*, a circular stone, covered with hieroglyphics, by which the Aztecs used to represent the months of the year. The palace of the Cortes, in the same square, consists of various buildings appropriated to offices of state, government schools, and public institutions of various kinds, but like everything else in Mexico, has been suffered gradually to fall to decay since the evacuation of the Spaniards. Mexico contains fourteen churches, some monasteries and convents, and numerous charitable institutions; the fine hospital has been converted into a barrack. There are schools of jurisprudence, medicine, agriculture, engineering, and an academy of the fine arts, containing valuable Aztec antiquities; also several theatres and a circus: the bull-ring was demolished in 1874. In addition to the ordinary *alameda* or public walk of a Spanish city, Mexico is remarkable for the extent and beauty of its *paseos*, or raised paved roads, planted with double rows of trees, which diverge far into the country from every quarter of the city. Mexico still boasts a few of the water-gardens for which the ancient city was so celebrated, and although no longer floating, as in the days of the Aztecs, they form attractive objects in the midst of the surrounding swamps, which, by the negligence of the Mexicans, have been suffered to increase in the vicinity of the lakes. The trade of Mexico is chiefly a transit-trade, although it has a few manufactures, as cigars of superior quality, gold-lace, hats, carriages, saddlery, &c.; and these articles, together with gold and silver, and some of the numerous valuable natural products of the Mexican plain, it transports, chiefly by means of mules, to Vera Cruz and other ports, importing in return the manufactured goods of Europe and various colonial products.

**MEXICO**, Gulf of, a basin of the Atlantic Ocean, the estimated extent of which is 800,000 English square miles, is closed in by the United States on the north, by Mexico on the west and south, and its outlet on the east is narrowed by the jutting peninsulas of Yucatan and Florida, which approach within 500 miles of each other. Right in the middle of this entrance is planted the island of Cuba, dividing the strait into two—the Strait of Florida, 120 miles wide, between Cuba and Florida, and the Strait of Yucatan, 105 miles wide, between Cuba and Yucatan. The former or northern entrance connects the Gulf with the Atlantic Ocean; the latter or southern, with the Caribbean Sea. The depth of water is supposed nowhere to exceed three-fourths of a mile, yet the gulf contains few islands—the Florida Keys, the deltas of the Mississippi, and a few on the coast of Yucatan, being the most import-

ant of them. The shores, which are very sinuous, form numerous bays, the largest of which is the Bay of Campeachy (q. v.). The coasts are mostly low and sandy or marshy, and are laved with numerous lagoons; good harbors are consequently not numerous, the best being those of Vera Cruz, New Orleans, Pensacola, and Havana. The gulf is visited by violent northern gales called *nortes*, which prevail from September to March, when they attain their maximum force, and then immediately terminate. The most remarkable feature in connection with the Gulf of M. is the *Gulf Stream* (q. v.), which enters it by the southern channel, passes round it, and emerges through the Strait of Florida. Owing partly to the presence of this heated current, the temperature of the gulf is  $8^{\circ}$  or  $9^{\circ}$  higher than that of the Atlantic in the same latitude.

**MEYERBEER**, Jakob, commonly called Giacomo Meyerbeer, a celebrated musical composer of the present age, was the son of a wealthy Jewish banker, and was born at Berlin, September 5, 1794. He was a precocious child, playing tunes on the piano spontaneously (it is said) as early as his fifth year. He began to study dramatic composition under Bernhard Anselm Weber; and in 1810 entered the school of Vogler at Darmstadt, where he formed an intimate friendship with the renowned Karl Maria von Weber. While at Darmstadt, he wrote a cantata, "Gott und die Natur." Subsequently, he composed an opera, "Jephthah," produced at Munich in 1812; but though warmly admired by his friends, Vogler, Weber, and others, it fell flat on the audience, and was considered a failure. He now proceeded to Vienna, where he acquired a brilliant reputation as a pianist; but another opera which he produced here by command of the court, "Die beiden Knechten," was no more successful than the previous one. Italian music was the rage at the time, and nobody had a chance who did not imitate Rossini. M. was induced by his friend Salieri to visit Italy, where he became an enthusiastic convert to the new Italian school, and began the composition of a series of operas which proved highly popular. We may mention his "Romilda e Costanza," (performed at Padua in 1819), "Semiramide" (Turin, 1819), "Emma di Resburgo" (Venice, 1820), the first of M.'s compositions that excited a furor; "Margherita d'Anjou" (1822), "Esule di Grenada" (1823), and "Crociato" (Venice, 1825). The last of these afforded, perhaps, the most decisive proofs of the high genius of its author, and was received with great applause in Paris, whither M. now proceeded, and took up his residence. In 1831, was produced, after numerous rehearsals, his "Robert le Diable," which caused an excitement "perhaps unparalleled in the history of the Parisian stage;" while it was received with nearly as great enthusiasm in England, Italy, Austria, and Russia; and in 1836, "Les Huguenots," in which he reached the climax of his fame. His next opera, "Le Prophète" (1849), fairly sustained his reputation. It was followed by "Pierre le Grand" (1854), "Dinorah" (1858), and "L'Africaine" (1865). M. died on May 2, 1864.

**MEZEN**, or Mezene, a district town in the government of Archangel, European Russia, 50 miles from the mouth of the river of the same name, remarkable for the salmon and herring fisheries which supply St Petersburg with frozen fish during winter. Pop. (1867) 1746.

**MEZEN**, or Mezene, a river in the north of European Russia, rises in the north of the government of Vologda, and flows north-west into the White Sea, having a course of about 450 miles.

**MEZIERES**, a fortified town of France, capital of the dep. of Ardennes, on the right bank of the Meuse, on the isthmus of a promontory formed by the river, which washes its walls on two sides, and separates it from Charleville (q. v.). It was strongly fortified by Vauban, and is defended by a citadel. It communicates with Charleville by a suspension-bridge. In 1815, the town held out for two months against the Allies, who besieged it after the battle of Waterloo. Over the north side of the church is a bomb-shell, which has been sticking there ever since the town capitulated. In 1520, the Chevalier Bayard, with 2000 men, successfully defended it against 40,000 Spaniards under Charles V. In the Franco-German war of 1871, M. capitulated after a cannonade of two days. Pop. (1876) 5204.

**MEZŐ-TÚR**, a town of Hungary, on the Berettyó, an affluent of the Körös, 60 miles south-west of Debreczen. Pottery is made, and there is an important market. Pop. (1867) 20,447.

Mezquite  
Miasma

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**MEZQUITE**, the name of two Mexican trees or shrubs, of the natural order *Leguminosæ*, sub-order *Papilionaceæ*, bearing pods filled with a nutritious pulp. The **COMMON M.** (*Algarobia glandulosa*) is a small shrub, with stems often decumbent, and armed with strong straight spines. It is found in great profusion throughout vast regions, chiefly consisting of dry and elevated plains. In dry seasons, it exudes a great quantity of gum (*Gum Mezquite*), similar in quality to gum-arabic, which seems likely to become a considerable article of commerce, and which has begun to be exported to San Francisco from the Mexican ports on the Pacific.—The **CURLY M.**, or **SCREW M.** (*Strombocarpa pubescens*), also called **SCREW BEAN** and **TOURNIL**, although only a shrub or small tree, is of great value in the wild and desert regions of the western part of North America, where it occurs along with willow-brushes near springs of water. Its wood is used as fuel, and the pulp of its pods for food. The pods are spirally twisted into compact rigid cylinders, from an inch to an inch and a half in length.

**MEZZOFANTI**, Giuseppe, Cardinal, a remarkable linguist, was born, 17th September 1774, at Bologna, where he received his education, and subsequently (1815) received the office of university librarian. In 1831, he settled in Rome, and was advanced to the dignity of a Monsignore; in 1833, he was appointed secretary of the College of the Propaganda; then keeper of the Vatican Library; and in 1838, he was raised to the dignity of cardinal. He died, 15th March 1849, at Rome. M.'s European reputation was founded, not on any literary or learned works that he wrote, but on the almost miraculous extent of his linguistic acquisitions. Towards the end of his life, he understood and spoke fifty-eight different tongues. As early, indeed, as 1820, Lord Byron called him "a walking polyglott, a monster of languages, and a Briareus of parts of speech." He was not in the strict sense a critical or scientific scholar; yet, although his linguistic skill lay chiefly in verbal knowledge, his acquirements in other departments were by no means inconsiderable. See Russell's "Life of Cardinal Mezzofanti" (Lond. 1858).

**MEZZOTINTO**. See ENGRAVING.

**MEZZOJU'SO** (Arab. *Menzil-Jusuf*, village of Joseph), a town of Sicily, in the province of Palermo, 18 miles south-south-east of Palermo city. It is one of the four colonies of Alibaulans, who, on the death of Scanderbeg, in the 15th c., fled to Sicily, to avoid the oppression of the Turks. They preserve their language to a great extent, and follow the Greek ritual, their priests being allowed to marry; but, except on fête-days, they are not to be distinguished in feature or dress from the peasantry of the rest of Sicily. Pop. 5700.

**MGLIN**, a town of Russia, in the government of Tchernigov, 125 miles north-north-east of the town of Tchernigov. There is a large cloth-factory, and a considerable number of German families. Pop. (1867) 5842.

**MHENDIGU'NJ**, a town of British India, in the territory of Onde, 90 miles south-east of Lucknow, 3 miles south of the right bank of the river Saeel. It is a busy, thriving place, with a pop. estimated at 20,000.

**MHOW**, a town of British India, in the territory of Indore, 13 miles south-west of the town of Indore, near the Vindhyan Mountains, on an eminence on the Gumber river. Near it are the cantonments, which have altogether the appearance of a European town, having a church with steeple on an eminence, a spacious lecture room, a well-furnished library, and a theatre. They are situated at an elevation of 2019 feet above the sea, and are occupied by a considerable force. On the 1st July 1857, the sepoys mutinied here, during the great rebellion of that year.

**MIAGAO**, a town in the island of Panay, one of the Philippine Isles, in the province of Iloilo. The inhabitants, who are industrious, comfortable, and well educated, are estimated at 81,000 in number.

**MIA'KO**, or **Kioto**, now called **SAR-KIYO**, the ancient capital of Japan, situated in the s. w. of the island of Nipon. Broad and clean streets cross each other at right angles, and the houses are mostly of the better class. During the double rule in Japan, it was the residence of the Mikado, then only the spiritual emperor, and was and is the stronghold of the national religion. Some of the temples are of

great size and splendor. In 1868, the great revolution broke out: the Shogun, or temporal ruler, was deposed, and the Mikado, who was now invested with complete authority, both temporal and spiritual, removed his court to Yedo. Most of the aristocratic dwellings are consequently tenanted, and the population in 1876 was only 374,496. M. is still, however, the seat of considerable trade with the interior. It is also a centre of Japanese literature and art, and is well provided with public schools for boys and girls, besides special provision for instruction in English, French, and German. It is famed for the manufacture and dyeing of silks.

MIA'MI, a river of Ohio, United States of America, rises by several branches in the western centre of the state, and after a south-south-west course of 150 miles through one of the richest regions of America, and the important towns of Dayton and Hamilton, empties itself into the Ohio River, 20 miles west of Cincinnati. It is sometimes called the Great M., to distinguish it from the Little M., a smaller river, which runs parallel to it, 15 to 25 miles east, through the Miami Valley.

MIA'SMA (Gr. pollution; in the plural, *Miasmata*), or Malaria. It is proved by the experience of all ages that there is an intimate connection between malarial districts and certain diseases, especially the various forms of intermittent and remittent fever; but the exact nature of the noxious agent, and the circumstances on which its formation and extrication depend, are even at the present day not altogether established. It is clearly neither heat nor moisture, for the crews of clean ships, when cruising in the tropics at a distance from land, are usually very healthy; nor is it any known gas extricated from the marsh, for the gases collected by stirring up marshes (carbonic acid, nitrogen, oxygen, and carburetted hydrogen) may be inspired without giving rise to any symptoms resembling those produced by malaria. It may be regarded as an established fact, that the noxious agent is a product of vegetable decomposition occurring under certain conditions of heat and moisture. That vegetable decomposition is the source of the poison, is inferred from various circumstances. For example, this special morbid influence is nowhere so powerful as in the deltas and along the banks of large tropical rivers which, in their flood bring down the washings of the soil, full of vegetable remains, which, upon the subsidence of the waters, are left reeking in the hot sun. Again, the poison has been traced, in various places in Italy, France, and the Netherlands, to the practice of steeping flax in stagnant waters, and even in streams; and in India, it was formerly the custom, after extracting the coloring matter, to throw the remains of the indigo into large heaps, which, in the course of three years, became excellent manure: it was found, however, that these heaps, alternately soaked by the heavy rains and heated by a tropical sun, decomposed and emitted miasmata precisely similar in their effects to those produced by marshes. Marsh-miasmata are seldom evolved at a temperature under 60°, but at and above 80° they are prevalent and severe; and the nearer we approach the equator, the more violent, as a general rule, do they become. Although moisture is necessary to the evolution of miasmata, an excess of it often acts as a preventive, and by impeding the access of atmospheric air, retards or prevents decomposition. This explains the apparent anomaly of an uncommonly rainy season producing opposite effects in different localities, sometimes not far distant from one another. Thus, in the West Indies, a very rainy season induces general sickness in the dry and well-cleared island of Barbadoes; while at Trinidad, whose central portions are "a sea of swamp," and where it rains nine months in the year, the excessive rain is a preservative from sickness; for in the seasons when rain falls only eight months or less, the swamps become dry and exposed to the sun, and severe remittent fevers are sure to follow.

Chemistry has hitherto failed in detecting any special ingredient to which the air evolved by marshes owes its poisonous qualities. The air collected in the most poisonous districts gives, on analysis, the same gases existing in the same proportions as normal air, nor (if we except the observations of Boussingault, which have not been confirmed by other chemists) does it give evidence of the presence of any organic body.

The infecting distance of this poison is a subject of great practical importance; and both the altitudinal range and the horizontal spread have to be noticed. In Italy, it is estimated that an altitude of about 1500 feet assures an exemption from marsh-poison; while in the West Indies, an elevation of at least 2000 feet is neces-

**Miasme**  
**Michael**

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sary. From observations made by Sir Gilbert Blane during the ill-fated Walcheren expedition, it appears that, in Europe, the horizontal spread of marsh-miasmata over fresh water is less than 3000 feet; but over salt water—at all events, in the tropics—the horizontal range is greater. The extent to which the poison may spread horizontally over land, is a much more complicated question, and depends, to a great extent, upon the nature of the soil. The effect of trees in intercepting miasmata is very remarkable, and is probably due partly to their condensing the vapors of the marsh, and partly to their altering the direction of the current of air. Pope Benedict XIV. caused a wood to be cut down which separated Villatri from the Pontine Marshes, and in consequence, for many years, there was a most severe and fatal fever in a district previously healthy; and the same results have in many other cases followed the removal of trees.

In districts where this poison exists, it is found by experience that those who go out of their houses only during the day, after the morning fogs have dispersed, and before the evening mists appear, often escape the bad effects; and a full meal, with a few grains of quinine, should be taken before exposure to the morning air by travellers in a malarious district.

Dr Wood of Philadelphia has pointed out the extraordinary and very important fact, that miasmata are neutralised, decomposed, or in some other way rendered innocuous by the air of large cities. Though malarious diseases may rage around a city, and even invade the outskirts, yet they are unable to penetrate into the interior, and individuals who never leave the thickly-built parts almost always escape. What it is in the air of the city which is thus incompatible with malaria, is unknown; but very probably it is connected with the results of combustion, for the fire and smoke of camps are asserted to have had the same effects.

**MIAUTSE**, the aborigines or hill-tribes of China. From the dawn of Chinese history, we find the people of the plains contending against those of the high lands, and to the present day the hardy mountaineers have maintained their independence. They consist of numerous tribes, occupying large portions of Kwang-se, Kweichow, Yun-nan, Sze-chuen, and adjacent provinces. Some of them own Chinese sway; other tribes are absolutely independent. They are smaller in size and stature, and have shorter necks, and their features are somewhat more angular than the Chinese. Their dialects are various, and wholly different from the Chinese. Dr Macgowan describes them as skilful in the manufacture of swords. He has shown that the M. of Western China and the Karens or hill-tribes of Burmah are identical.—Reports of Dr Macgowan's Lectures.

**MIAVA**, a market-town of North-west Hungary, on the Miava, an affluent of the Morava, 43 miles east-north-east of Presburg city. There are manufactures of woollen cloth and bagging, and hemp and flax are cultivated. Pop. (1869) 9637.

**MICA** (from the same root with Lat. *mico*, to glitter), a mineral consisting essentially of a silicate of alumina, with which are combined small proportions of silicates of potash, soda, lithia, oxide of iron, oxide of manganese, &c., according to which and the somewhat varying external characters, numerous species have been constituted by mineralogists. **COMMON M.**, also called **POTASH M.**, contains a notable but variable proportion of silicate of potash; it contains also a little fluorine. It is a widely diffused and plentiful mineral, entering largely into the composition of granite, mica-slate, and some other rocks, veins and fissures of which it also often fills up. It has a strong, and often almost metallic lustre. It is remarkable for the readiness with which it splits into thin elastic plates, which are generally transparent. The thinness and elasticity of these plates readily distinguish them from those of talc, and of the laminated variety of gypsum; they are also devoid of the greasy feel of talc. They are sometimes not more than one 800,000th part of an inch in thickness, are generally quite transparent, and are therefore much used in setting objects for the microscope. Plates of M. of large size are also used in Siberia, Peru, and Mexico as a substitute for glass in windows. Large plates, often a yard in diameter, are found in these countries, and in Norway and Sweden. M. is advantageously substituted for glass in lanterns, as it bears sudden changes of temperature better than glass, and in ships-of-war, as it is not liable to be broken on the discharge of cannon. Another use of M. is for making an artificial *avanturine*; it is also employed in a powdered state to give a brilliant appearance

to walls, and as a sand to sprinkle on writing. In the state of a very fine powder, it is known as *Cat's Gold* or *Cat's Silver*, according to its color. It is usually colorless, but sometimes white, gray, green, red, brown, black, and rarely yellow, owing to the presence of iron, manganese, chrome, fluorine, &c., in its composition. It is sometimes found in beautiful crystals, which are generally rhombic or six-sided tables—*LITHIA M.*, or *LEPIDOLITE*, contains lithia in small proportion. It is often of a rose color, or a peach-blossom color. It is used for ornamental purposes. It is found in several places in Britain.—*MAGNEsia M.*, or *BIOTITE*, contains about as much magnesia as alumina. It is often dark green.

*MICA-SCHIST* is, next to gneiss, one of the most abundant of the Metamorphic Rocks (q. v.). It consists of alternate layers of mica and quartz, but is sometimes composed almost entirely of the thin and shiving plates or scales of mica, and from this it passes by insensible gradations into clay-slate. The quartz occurs pure in thin layers like vein quartz. Garnets are in some districts abundant in this rock, making up a large proportion of the whole mass. Mica-schist is believed to be a highly altered shale or clay deposit, and the component minerals, including the garnets, to have been developed under the influence of metamorphic action from materials already existing in the unaltered strata. In many places, the mica-schist has a finely corrugated or wavy structure.

*MICAH*, the sixth (third in the lxx.) of the twelve minor prophets (Micah: Who is like unto Jah?), probably a native of Moresheth, prophesied during the reigns of Jotham, Ahaz, and Hezekiah, and was therefore contemporary with Isaiah, and Hosea, and Amos.—The Book of M. is regarded as divisible into three parts, each commencing with "Hear ye," organically connected, however, with each other, and shewing even a progressive development of idea in the mind of the writer. The destruction of Samaria (Israel), the danger and subsequent captivity of Judah; the wickedness of the rulers, the punishments that overtake the land, the glorious restoration of the theocracy; Jehovah's "controversy with his people" on account of their sins, his warnings, his exhortations, and his sublime promise of forgiveness, form the principal points of M.'s prophecies, which relate to the invasions by Sennacherib, Sennacherib, the Babylonian exile, the return, and the re-establishment of the theocracy under Zerubbabel. The style of M. is clear, vivid, concise, yet richly poetical; some passages, especially in the beginning and the last two chapters, are among the noblest in the Old Testament. The play upon words noticeable in Isaiah is also a marked feature of this writer.

*MICHAEL ANGELO (BUONAROTTI)*, who, in an age when Christian art had reached its zenith, stood almost unrivalled as a painter, sculptor, and architect, was born in 1474 at Chiusi, in Italy. He was of noble origin, having descended on his mother's side from the ancient family of Canossa, in Tuscany, while the Buonarrotti had long been associated with places of trust in the Florentine republic. M. A. learned the rudiments of painting from Bertoldo, a pupil of Domenico Ghirlandajo; and having been admitted as a student into the seminary which was established by Lorenzo the Magnificent for the study of ancient art in connection with the collections of statuary in the Medicean Gardens, he attracted the notice of Lorenzo by the artistic skill with which he had restored the mutilated head of a laughing faun, and was received into the palace of the Medici, where he spent several years. Lorenzo's death in 1492, and the temporary reverses which befell the Medici family in consequence of the incapacity of his successor, Piero, led M. A. to retire to Bologna, whence he soon removed to Rome, whither his fame had preceded him. His earliest original works were a Kneeling Angel, executed for the grave of St Dominic, at Bologna; the statues of Bacchus and David at Florence; and a magnificent group representing the "Mater Dolorosa," which was placed in St Peter's at Rome. Next in order of time, and, according to some of his contemporaries, first in merit, ranks M. A.'s great cartoon for the ducal palace at Florence, which, together with the pendant executed by Leonardo da Vinci, has long since perished. This work, which represented a scene in the wars with Pisa, when a number of young Florentines, while bathing in the Arno, are surprised by an attack of the Pisans, shewed so marvellous a knowledge of the anatomical development of the human figure, and such extraordinary facility in the powers of execution, that it became a study for artists of every land, and by its excellence created a new era in art. Pope Julius II. called

Michael  
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M. A. to Rome, and commissioned him to make his monument, which was to be erected within St Peter's. Although this work was never completed on the colossal scale on which it had been designed, and was ultimately erected in the church of St Pietro ad Vincula, it is a magnificent composition, and is memorable for having given occasion to the reconstruction of St Peter's on its present sublime plan, in order the better to adapt it to the colossal dimensions of the proposed monument. The pope insisted upon M. A. painting with his own hand the ceiling of the Sistine Chapel, and although unwillingly, he began in 1509 and completed within less than two years his colossal task, which proved one of the most marvellous of his works. The subjects of these cartoons are taken from the book of Genesis, while between these and the representations of the persons of the Saviour's genealogy are colossal figures of prophets and sibyls. M. A.'s genius was too often trammelled by the unworthy tasks in which Leo X. and successive popes engaged him, the former having employed him for years in excavating roads for the transportation of marble from Carrara, and in other ignoble labors. The Florentines and Bolognese vied with the pontiffs in trying to secure his services; and to his skill as an engineer Florence was indebted for the plans of the fortifications by which she was enabled for a prolonged time to resist the attempts of the Medici to recover possession of the city after their expulsion from it. On the surrender of Florence, he returned to Rome, where his great picture of the Last Judgment was painted for the altar of the Sistine Chapel. This colossal fresco, nearly 70 feet in height, which was completed in 1541, was regarded by contemporary critics as having surpassed all his other works for the unparalleled powers of invention and the consummate knowledge of the human figure which it displayed. After its completion M. A. devoted himself to the perfecting of St Peter's, which, by the touch of his genius, was converted from a mere Saracenic hall into the most superb model of a Christian church. He refused all remuneration for this labor, which he regarded as a service to the glory of God. M. A. died in 1563, at Rome, but his remains were removed to Florence and laid within the church of Santa Croce. His piety, benevolence, and liberality made him generally beloved; and in the history of art, no name shines with a more unsullied lustre than that of Michael Angelo.—See Vassari's "Vite de' Pittori" (Eng. trans), and "Lives" by Dappa (1806), Harford (1857), and Wilson (1876).

MICHAEL VI., surnamed PALÆOLOGUS, emperor of Constantinople. See PALÆOLOGUS.

MICHAELIS, Johann David, one of the most eminent and learned biblical scholars of the 18th c., was born on 27th February 1717, at Halle, where his father, Christian Benedict Michaelis, a theologian and orientalist of some distinction, was a professor. After completing his studies at his native university, he travelled in England and Holland, where he made the acquaintance of several celebrated scholars. In 1745 he became a professor of philosophy at Göttingen, and took an active part in the formation of a scientific association there. From 1753 to 1770, he was one of the editors of the "Göttinger gelehrten Anzeigen," and for some years he filled the office of librarian to the university. During the Seven Years' War, he was occupied in making preparations for an expedition of discovery in Arabia, which was afterwards made by Niebuhr. In the latter years of his life, he was almost always in the professorial chair or at his desk. He died on 22d August, 1791. M. was a man of vast attainments in history and archaeology, and his labors were of great importance in the departments of Biblical Exegesis and History. He may be regarded as among the earliest of the critical school of German theologians, but he lived at too early a period to acquire anything like a consistent or systematic theory of the genesis of the Hebrew Scriptures. He loved to rationalise in details, and was never quite certain what to think about inspiration; at all events, he seeks constantly to prove how thoroughly *human* the Mosaic legislation was, though he does not exactly deny its claims to being considered a Divine revelation. Many of his pupils became professors, and disseminated his principles through the German universities.

M.'s chief works are his "Einleitung in die göttlichen Schriften des Neuen Bundes" (2 vols. Göt. 1750; English by Bishop Marsh); his "Mosaisches Recht" (6 vols. Frankf. 1770—1775; English by Dr Alexander Smith, 1814); and his

"Moral" (3 vols. Gött. 1792—1822). See his "Lebensbeschreibung von ihm selbst abgefasst" (Hirtel und Leip. 1798).

**MICHAELMAS DAY.** See **ASTER**.

**MICHAELMAS DAY**, one of the English quarter-days for payment of rent by tenants—viz., 29th September. Michaelmas term is one of the four legal terms during which the English courts of law and equity sit daily for despatch of business. It begins on the 2d, and ends on the 25th November. Michaelmas Head Court is the name given in Scotland to the annual meeting of heritors or freeholders of each county to revise the roll of freeholders, the duties being now discharged by the Commissioners of Supply.

**MICHELET, Jules**, a brilliant French historian, born at Paris 21st August 1798. He studied with great success under Villemain and Leclerc, and at the age of 23 became a professor in the Collège Rollin, where he taught history, philosophy, and the classics. In 1826, he published "*Les Tableaux Synchroniques de l'Histoire Moderne*," and was named Master of Conferences (*Maître des Conférences*) at the *École Normale*. After the revolution of 1830, he was chosen head of the historic section, intrusted with the care of the archives of the kingdom, assistant to Guizot at the Sorbonne, and tutor to the Princess Clémentine, daughter of the French king, and published several valuable books, such as "*Précis de l'Histoire Moderne*" (1838, of which there have been more than 20 editions), "*Précis de l'Histoire de France jusqu'à la Révolution Française* (the 7th edition of which appeared in 1842), "*Mémoires de Luther*" (1835), "*Origines du Droit Français cherchées dans les Symboles et Formules du Droit Universel*" (1837). In 1838, he succeeded Daunou in the Collège de France, and Comte Reinhard in the professorship of Moral Philosophy. He now plunged into controversy with all the vivacity and impetuosity of his nature. The Jesuits were the grand objects of his dislike; and eloquence, sarcasm, sentiment, and history were all brought to bear upon them with brilliant effect. Three books were the fruits of his polemic: "*Des Jésuites*, in conjunction with Edgar Quinet" (1843); "*Du Prêtre de la Femme, et de la Famille*" (1844); "*Du Peuple*" (1846). In 1847 appeared the first volume of his "*Histoire de la Révolution*;" and it was finished in 1853, in 6 vols. When the affair of 1848 broke out, acting more wisely than most of his learned *confrères*, he declined to take an active part in political struggles, and quietly pursued his literary avocations. He, however, lost his situation in the Archives Office after the *coup d'état*, by refusing to take the oath of allegiance to Louis Napoleon. Other works of his were "*L'Oiseau*" (1856), "*L'Insecte*" (1857), "*L'Amour*" (1858), and "*La Femme*" (1859); "*La Mer*" (1861), "*La Sorcière*" (1862), "*La Bible de l'Humanité*" (1864); and "*Nos Fils*" (1866) a plea for compulsory education. His master-piece is his "*Histoire de France*," continued in "*Histoire de la Révolution Française*, and "*Histoire du XIX<sup>me</sup> Siècle*. M. died in 1874.

**MICHIGAN**, one of the United States of America, lying in lat. 41° 40'—48° 20' n., and long. 82° 25'—90° 34' w. It is bounded on the n. by Lake Superior and St Mary's River; e. by Lake Huron, River and Lake St Clair, Detroit River and Lake Erie; s. by the states of Ohio and Indiana; and w. by Lakes Michigan and Wisconsin, and has an area of 56,243 square miles, or 35,995,520 acres. It is divided into 77 counties. The capital is Lansing; the chief towns are Detroit, Grand Rapids, East Saginaw, Jackson, Bay City, Saginaw City, &c. M. is divided by Lakes Michigan and Huron into two irregular peninsulas—the upper, a wild and rough region of mountains and forests, containing about one-third the area of the state, lies between the northern portions of Lakes Michigan and Huron, and Lake Superior; while the lower is nearly enclosed in a vast horse-shoe bend of Lakes Michigan, Huron, Erie, and the connecting straits and rivers. In the upper peninsula are the Porcupine Mountains, rising to a height of 2000 feet, with sandy plains and forests. The southern is a level, rich, fertile country of prairies and oak-openings, watered by numerous rivers, as the Grand, Kalamazoo, Muskegon, Saginaw, &c. The lower peninsula is of limestone strata, with coal and gypsum; the upper, of azoic formations, with metamorphic slates, gneiss rocks, trap, and rich mines of copper and iron. The climate is mild in the southern, and cold and bleak in the northern regions. The southern portion produces wheat, maize, fruits, butter, cheese, and wool in great



abundance. Vast quantities of pine-lumber are exported from the northern half of the state. The principal manufactures are flour and woollens. The extensive coast and rivers afford great facilities to navigation, while several railways traverse the state. The government is similar to those of the other states, and the school-system is based on that of Prussia, with abundant revenues from public lands. The university of M. at Ann Arbor has 44 professors, and a foundation of 1,000,000 acres of land. The only charge to students who are resident in M. is 10 dollars admission, and 15 dollars annual fee. Detroit was settled by the French in 1610, who also established a trading port at Mackinaw at about the same period. The British took Detroit in 1812, but restored it at the end of the war. The state was admitted to the Union in 1837. Pop. in 1840, 212,267; in 1850, 397,654; in 1880, 1,689,987.

**MICHIGAN**, a lake in the United States of America, the second in size of the five great fresh-water lakes, and the only one lying wholly in the United States, having Michigan on the n. and e., and Wisconsin on the w. It is 390 miles long, 70 miles in mean breadth, and 1000 feet in mean depth. It is 578 feet above the level of the sea, and has been found by accurate observations to have a lunar tidal wave of three inches. It is the outlet of numerous rivers, and is connected by a canal, and sometimes by flooded rivers, with the Mississippi, which is believed to have been its ancient outlet. Its principal harbors are those of Chicago, Milwaukee, and Grand Haven; and its bold and, at certain seasons, dangerous shores are guarded by 23 light-houses. It forms, with the lower lakes and the St Lawrence, a natural outlet for one of the richest grain-growing regions in the world.

**MICROCOSM AND MACROCOSM.** The belief, current in ancient times, that the world or cosmos was animated, or had a soul (see *ANIMA MUNDI*), led to the notion, that the parts and members of organic beings must have their counterparts in the members of the cosmos. Thus, in a hymn ascribed to Orpheus, the sun and moon are looked upon as the eyes of the animating godhead, the earth and its mountains as his body, the ether as his intellect, the sky as his wings. The natural philosophers of the 16th c.—Paracelsus at their head—took up this notion anew in a somewhat modified shape, and considered the world as a human organism on the large scale, and man as a world, or cosmos, in miniature; hence they called man a *microcosm* (Gr. little world), and the universe itself, the *macrocosm* (great world). With this was associated the belief, that the vital movements of the microcosm exactly corresponded to those of the macrocosm, and represented them, as it were, in copy; and this led naturally to the further assumption, that the movements of the stars must exercise an influence on the temperament and fortunes of men. See **ASTROLOGY**.

**MICROCOSMIC SALT** is a tribasic phosphate of soda, oxide of ammonium, and water, which crystallises with 8 equivalents of water, its formula being  $\text{NaO}, \text{H}_4\text{NO}, \text{HO}, \text{PO}_5 + 8\text{Aq}$ . It is prepared by mixing a hot solution of 6 parts of phosphate of soda with a concentrated solution of 1 part of muriate of ammonia, when the microcosmic salt crystallises in large transparent prisms, while common salt remains in solution. On the application of heat, it first loses its water of crystallisation, and then its oxide of ammonium and basic water, so that only metaphosphate of soda remains, which, from its ready fusibility into a colorless glass, is valuable as a flux in blow-pipe experiments. See **BLOW-PIPE**. This salt occurs in decomposed urina.

**MICROMETER** (Gr. *metros*, little; *metron*, measure) is an instrument used for the measurement of minute distances and angles. Its different forms, depending on different principles, may be divided into two sections, according as they are applied to Physics or Astronomy. Of the former section are the Vernier (q. v.) and the Micrometer Screw, the latter instrument being merely a screw with a very regular thread, and a large round head, which is carefully graduated, generally to sixtieths, and furnished with an index. It is easily seen that if a complete turn of the screw advance its point 1-20th of an inch, a turn sufficient to pass the index from one graduation to another will only advance it 1-1200th of an inch, &c. This is the micrometer used in the construction and graduation of instruments. Of those applied to astronomical purposes, the most simple is a short tube, across the opening of which are stretched two parallel threads, which are moved to or from each other by screws. These threads are crossed by a third perpendicularly, and the whole ap-

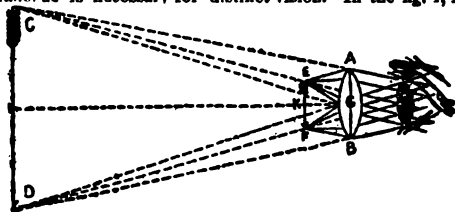
paratus is placed in the focus of a lens. The distance of two stars is found by adjusting the two parallel threads, one to pass through the centre of each star, taking care that the threads are placed perpendicular to the line joining the stars, and finding how many turns and parts of a turn of the screw are required to bring the wires to coincide. The angle of position of two stars is also obtained by turning round the instrument till the third wire, which is normally horizontal, bisects both stars, and reading off on the circumference the arc passed over. *Fraunhofer's suspended annular micrometer* consists merely of a steel ring surrounded by a flat rim of glass, and the position of the star is deduced from the time when it crosses the ring and its path while within it. The Abbé Rochon substituted for the wire micrometer one made of two prisms of rock-crystal or Iceland spar, capable of double refraction.

**MICROPHONE.** This instrument, invented in 1878 by Professor Hughes, does for faint sounds what the microscope (q. v.) does for matter too small for sight; the fall of a bit of tissue-paper or the tread of a fly being rendered audible at many miles distance. In principle the microphone illustrates the action of sonorous vibrations on the strength of an electric current. One of the most sensitive substances for microphonic action is willow-charcoal, plunged in a state of white heat into mercury. The theory is that in a homogeneous conductor the compressions and dilations of the molecules balance each other, and no variation of current ensues, while under minute subdivision, with electrical continuity, sonorous waves affect the strength of an electric current, and variations in the current reproduce sonorous waves. One form of microphone consists of a piece of mercury-tempered carbon, an inch long, placed vertically between two carbon-blocks hollowed to receive its ends, wires connecting the blocks with the battery and the receiver by which the sounds are to be heard. "A piece of willow-charcoal," says the inventor, "the size of a pin's-head is sufficient to reproduce articulate speech." Two nails laid parallel, with wire connections, and a third nail laid across them, make a simple form of microphone. A few cells of any form of battery may be used. A continuous sound has been made by the mutual interaction of the microphone and Telephone (q. v.), each instrument in turn repeating the sound made by the other. Many useful applications of the microphone have been made or suggested.

**MICROSCOPE** (Gr. *mikros*, small, and *skopeo*, I see) is an instrument for enabling us to examine objects which are so small as to be almost or quite undiscernible by the unaided eye. Its early history is obscure; but as it is quite evident the property of magnifying possessed by the lens must have been noticed as soon as it was made, we are quite safe in attributing its existence in its simplest form to a period considerably anterior to the time of Christ. It is generally believed that the first compound microscope was made by Zacharias Jansen, a Dutchman, in the year 1590, and was exhibited to James I. in London by his astronomer, Cornelius Drebbel, in 1619. It was then a very imperfect instrument, coloring and distorting all objects. For many years, it was more a toy than a useful instrument, and it was not until the invention of the acromatic lens by Hall and Dollond, and its application to the microscope by Lister and others, that it reached the advanced position it now occupies among scientific instruments.

An object to be magnified requires simply that it be brought nearer to the eye than when first examined, but as the focal distance of the eye ranges from 6 inches to 14 inches—10 inches being the average focal distance—it follows that a limit to the magnifying power of the eye is attained whenever the object to be examined is brought so near. If, however, we blacken a card, and pierce a hole in it with a fine needle, and then imagine a minute object, as, for instance, the wing of an insect held about an inch from the card, we shall see it distinctly, and that too magnified about ten times its size. This is explained by the fact, that the pin-hole limits the divergence of the pencil of rays, so that the eye can converge it sufficiently on the retina to produce a distinct impression, which is faint; and did not the blackened card exclude all other light, it would be lost. If we now remove the blackened card without either removing our eye or the object under examination, it will be found that the insect's wing is almost invisible, the unaided eye being able to see clearly an object so near as one inch; thus demonstrating the blackened card with the needle-hole in it to be as decided a magnifying instrument as any set of lenses.

By the apparent size of an object is understood the angle formed by two lines drawn from the centre of the eye to the extremities of the object, which is larger when the object is nearer the eye than when further removed. This angle is called the angle of vision, and is quite distinct from the angle of the pencil of light, by which the object is seen. The focal length of a lens determines its magnifying power. The object to be examined is placed in its focus, so that the light which diverges from each point may, after refraction by the lens, proceed to the eye in lines as nearly parallel as is necessary for distinct vision. In the fig. 1, AB is a doublet



convex lens, in the focus of which we have drawn an arrow, EF, to represent the object under inspection. The cones drawn from its extremities are portions of the rays of light diverging from these points, and falling on the lens. These rays, if not interrupted in their course by the lens AB, would be too divergent to permit their being brought to a focus upon the retina by the lenses which constitute the eye. But as they are first passed through the lens AB, they are bent into nearly parallel lines, or into lines diverging from some points within the limits of distinct vision, as from CD. Thus bent, these rays are received by the eye as if proceeding from the larger arrow CD, which we may suppose to be ten inches from the eye, and then the ratio of the length of the virtual image to that of the real arrow (nearly 10 to 1) gives the magnifying power of the lens in question. The ratio of CD to EF is the same as that of HG to KG. Now, HG is the distance of distinct vision, and KG the focal length of the lens, so that the magnifying power of a lens is obtained by dividing the distance of distinct vision (ten inches for most individuals) by its focal

length. Thus, if the focal length of a lens be  $\frac{1}{4}$  inch, the magnifying power is —  

$$= 40.$$
 This supposes that the distance between the eye and the lens is so small as not materially to interfere with the correctness of this statement.

We have supposed the whole of the light to enter the eye through the lens AB (fig. 1), but we must now state that so large a pencil of light passing through a single lens would be so distorted by its spherical figure, and by the chromatic dispersion of the glass, as to produce a very indistinct and imperfect image. This is so far rectified by applying a stop to the lens, so as to allow only the central portion of the pencil to pass. But while such a limited pencil would represent correctly the form and color of the object, so small a pencil of light is unable to bear diffusion over the magnified picture, and is therefore incapable of displaying those organic markings on animals or plants which are often of so much importance in distinguishing one class of objects from another. Dr Wollaston was the first to overcome this difficulty, which he achieved by constructing a doublet, which consists of two plano-convex lenses, having the focal lengths in the proportion of 1 to 3, and placed at a distance best ascertained by experiment. Their plane sides are placed towards the object, and the lens of shortest focal length next the object. By this arrangement, the distortion caused by the first lens is corrected by the second, and a well-defined and illuminated image is seen. Dr Wollaston's



doublet was further improved by Mr Holland, who substituted two lenses for the first in Dr Wollaston's doublet, and retained the stop between them and the third. This combination, though generally called a triplet, is virtually a doublet, inasmuch as the two lenses only accomplish what the anterior lens did in Dr Wollaston's



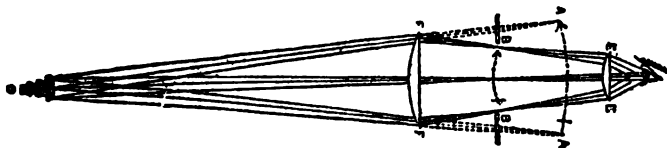
doublet, although with less precision. In this combination of lenses, the errors are still further reduced by the close approximation of the lenses to the object, which causes the refractions to take place near the axis, and thus we have a still larger pencil of light transmitted, and have also a more distinct and vivid image presented to the eye.

**Simple Microscope.**—By this term we mean an instrument by means of which we view the object through the lens directly. These instruments may be divided into two classes—those simply used in the hand, and those provided with a stand or frame, so arranged as to be capable of being adjusted by means of a screw to its exact focal distance, and of being moved over different parts of the object. The single lenses used may be either a double convex or a plano-convex. When a higher power is wanted, a doublet, such as we have already described, may be employed, or a Coddington lens, which consists of a sphere in which a groove is cut and filled up with opaque matter. This is perhaps the most convenient hand lens, as it matters little, from its spherical form, in what position it is held. In the simple microscope, single or combined lenses may be employed, varying from a quarter to two inches. There are many different kinds of stands for simple microscopes made, but as they are principally used for dissection, the most important point next to good glasses is to secure a firm large stage for supporting the objects under examination. When low powers alone are used, the stage movements may be dispensed with; but when the doublet or triplet is employed, some more delicate adjustment than that of the hand is necessary.



**Compound Microscope.**—In the compound microscope the observer does not view the object directly, but an inverted image or picture of the object is formed by one lens or set of lenses, and that image is seen through another lens. The compound microscope consists of two lenses, an object and an eye lens; but each of these may be compounded of several lenses playing the part of one, as in the simple microscope. The eye-lens is that placed next the eye, and the object-lens that next the object. The former is also called the ocular, and the latter the objective. The object-glass is generally made of two or three achromatic lenses, while the eye-piece generally consists of two plano-convex lenses, with their flat faces next the eye, and separated at half the sums of their focal lengths, with a diaphragm or stop between them. Lenses of high power are so small as to admit only a very small beam of light, and consequently what is gained in magnifying power is often worthless from deficient illumination. Various devices have been employed to overcome this difficulty. The light may be concentrated by achromatic condensers placed beneath the stage, or the curvature of the lens may be such as to allow as large a number of divergent rays as possible to impinge upon it. Such a lens is said to have a large "angle of aperture," the angle of aperture being that made by two lines converging from the margins of the lens to its focal point. Recently lenses, termed "immersion lenses," have been constructed, of such a curvature that when immersed in a drop of water placed over the object, light is admitted on all sides. With an immersion lens there is high magnifying power with sufficient illumination.

The following diagram explains the manner in which the compound microscope acts. We have here represented the triple achromatic objective, consisting of three achromatic lenses combined in one tube, in connection with the eye-piece, which consists of the field-glass FF, and the eye-glass EE. Three rays of



ing of three achromatic lenses combined in one tube, in connection with the eye-piece, which consists of the field-glass FF, and the eye-glass EE. Three rays of

light are represented as proceeding from the centre, and three from each end of the object. These rays would, if not interfered with, form an image at AA; but coming in contact with the field-glass FF, they are bent, and made to converge at BB, where the image is formed, at which place a stop or diaphragm is placed to intercept all light, except what is required to form a distinct image. From BB, the rays proceed to the eye-glass exactly as they do in the simple microscope, and as we have explained in fig. 1. The image therefore formed at BB is viewed as an original object by an observer through the eye-piece EE. The lens FF is not essential to a compound microscope; but as it is quite evident that the rays proceeding to AA would fall without the eye-lens EE, if it was removed, and only a part of the object would thus be brought under view, it is always made use of in the compound microscope.

A mirror is placed under the stage for reflecting the light through the object under observation. This method of illumination by transmitted light is used when the object is transparent. When opaque, light is reflected on the object by a bull's-eye lens, called a condenser. The best instruments are supplied with six or seven object-glasses, varying in magnifying power from 20 to 2500 diameters. The eye-pieces supplied are three in number, each of which consists of two plano-convex lenses, between which a stop or diaphragm is placed, half-way between the two lenses. As the magnifying power of a compound microscope depends on the product of the magnifying powers of the object-glass and the eye-piece, it follows that its power may be increased or diminished by a change in either or both of these glasses. In the mechanical arrangements, it is of importance to have the instrument so constructed, that while every facility is afforded for making observations and easy means of adjustment, there should also be great steadiness, without which, indeed, no satisfactory results will be obtained. These ends are achieved in various ways, of which one of the simplest is a brass stand, supported on three feet; mirror supported on trunnions; diaphragm, pierced with circular holes of various sizes, to regulate the admission to the object of reflected light from the mirror; stage-plate, on which the object is placed; screw, with milled head for fine adjustment; the object glass or objective; brass tube in which the body of the instrument is moved, so as to effect the coarse adjustment; the eye-piece, or ocular.

The microscope has now become so important an instrument in education, that almost every department of science in which it can be employed has a microscope suited to its particular kind of work, and a special treatise explaining and illustrating its use; and many branches of science have instruments peculiarly their own. Thus, chemists, anatomists, zoologists, &c., have each an instrument which they value as being peculiarly adapted for their special fields of inquiry and observation. From this instrument the chemist, and natural philosophers generally, have derived great assistance in studying the different kinds of crystals; for by means of it, they can not only observe and recognise the great variety of forms that exist, but at any moment, and with little trouble, they may witness the process of crystallisation, and leisurely study it. Those sciences in which it is most used, and for which it has done most, are anatomy, physiology, botany, zoology, medicine, mineralogy, and geology. In the practice of medicine all medical men who aim at a scientific treatment of disease have fully recognised how useful it has been as an agent in diagnosis, more especially in diseases of the kidneys. In the detection of crime and the vindication of innocence it is no less useful, as by means of it we can with certainty determine whether a suspicious stain, found for instance on the clothing of an individual charged with murder, has been caused by blood or by another coloring matter. In like manner, we can determine whether hair found in similar circumstances belongs to a human being or not. It has also enabled us to distinguish the difference existing between substances that have a similar chemical reaction (e. g., the various kinds of starch, as flour, potato, sago, &c.), and thus we are provided with an agent quick in detecting adulteration.

A few hints to amateur observers may not be out of place here. In choosing an instrument, the simpler it is the better. The essential point to attend to is, to have good glasses, which are tested by their power of showing some very minute markings, such as we find on diatoms. The circumference of the field of view should not be tinged with color, and the definition should be as good at the edge as at the centre. The beginner should use low powers in preference to high ones. The best

light is that reflected from a white cloud during the day. Artificial light should, if possible, be avoided. The table must be steady on which the microscope is placed, and when not in use, the instrument should be covered by means of a glass shade. The observer also requires a few oblong glass slides, and a few circles of thin glass, called covering-glasses, to lay over the preparation under examination. For making sections, dissecting, and the various manipulatory operations attending the use of the microscope, he requires, moreover, a pair of forceps, a knife, or, perhaps better, a razor ground flat on the one side, a few needles fixed in handles, and two or three hair-pencils. So equipped, the observer is able to begin examinations of texture at once with pleasure and advantage. Begin with simple objects, such as pollen and thin slices of the cuticle of flowers, mosses, and different kinds of starch, such as *tous le mois*, buck, yam, cycas, arrow-root, &c., and notice particularly their different characters. Make as thin a section as possible, place it on the centre of the slide, and allow a drop of water to fall on it from the end of the handle of the needle. Then allow the covering-glass to fall gently on it—obliquely, so as to press out any small bubbles of air. He should also have a few bottles containing "reagents," such as dilute acetic acid (equal parts of pyroligneous acid and water) and liquor potassæ. By means of these reagents, peculiarities of structure may often be observed.

Microscopes vary much in price, from 5s. to upwards of £100. A good serviceable dissecting simple microscope may be had from any philosophical-instrument maker for from 9s. to 15s. Compound microscopes are more expensive, but a wonderfully good instrument for beginners can be had at 30s. It has one eye-glass and three object-glasses, and magnifies from 70 to 200 diameters. If a superior instrument is wished—one suited for most purposes of observation and research—one of the following will be found well worth the price:—The microscope of Hartnack, with a joint, so that it may be inclined at any angle, has two-eye pieces, two object-glasses, magnifies from 50 to 450 diameters, and costs about £7; Næcher's microscope has three eye-pieces, three object-glasses, magnifies from 50 to 750 diameters, and costs £10; Smith and Beck's educational microscope has two eye-pieces, two object-glasses, magnifies from 50 to 350 diameters, and costs £10; Ross supplies microscopes from £5 to £100, with various number of glasses.

For a more complete account of the different kinds of microscopes, and the various purposes to which they are applied, see Quekett "On the Microscope" (1865); Carpenter "On the Microscope" (1862); Hogg "On the Microscope" (1865); and "How to work with the Microscope" (1864), by Beale.

**MICROZAMIA**, a genus of plants of the natural order *Cycadaceæ*. They are widely diffused over Australia. The fronds resemble those of palms, and are used in the Roman Catholic Church on Palm Sunday. The underground stem is large and turnip-like, but covered with scale or leaf-scars, and contains a substance resembling tragacanth. The nuts of *M. spiralis* are edible, but are only used in times of scarcity.

**MIDAS**, a common name of the more ancient Phrygian kings, of whom Midas, the son of Gordius and Cybele, is the most famous. He was a pupil of Orpheus. Among the many legends regarding him is one, that Bacchus granted his wish, that whatever he touched might become gold; from which so great inconvenience ensued, that he was glad to get himself relieved from the burden by washing, at the command of the god, in the Pactolus, the sands of which became thenceforth productive of gold. Another legend represents him as having offended Apollo by assigning the prize in a musical competition to Pan, and as having therefore been endowed by him with a pair of ass's ears, which he concealed under his Phrygian cap, but which were discovered by his servant.

**MIDDELBURG**, a town of the Netherlands, capital of the province of Zeeland, in the island of Walcheren. It is connected with the sea by a canal, five miles long, which admits ships of heavy burden, and is a station of the railway from Flushing to Roosendaal to join the Dutch and Belgian lines. Pop. (1st Jan. 1875) 15,928. The city is nearly circular, and a league in circumference, surrounded by a broad canal. In former times, M. was one of the leading mercantile cities of the United Provinces, sending many ships to the East and West Indies, America, and all European ports, founding the colonies of Surinam, Berbice, Essequibo, Demerara, &c.; but the

Middle  
Middlesbrough

60

opening of the Scheldt for Antwerp, and other causes, have reduced the foreign trade to single ships to Java. Many of the inhabitants are wealthy, which, with its being the meeting-place of the provincial states of Zeeland, and possessing a considerable trade in grain, salt, &c.—making beer, vinegar, starch, leather, having snuff, chocolate, oil and saw mills, and foundries—make it still a city of importance. It is the finest city of the northern provinces, having handsome houses, ornamented with gardens, and the canals and streets shaded with trees. The Town-house, founded in 1468, has a beautiful tower, and is decorated with 25 colossal statues of Counts and Countesses of Holland. At the beginning of the 12th c., an abbey was founded, which was, later, enriched by Willem I., Count of Holland and Zeeland. The buildings are now occupied as the meeting-place of the provincial states.

M. does not date further back than the 9th century. In 1574, the Spaniards, under Mondragon, were compelled by famine to give up M., after having defended it for 22 months against Prince Willem I. Though troops are stationed in M., it is no longer tenable against an enemy.

**MIDDLE AGES**, the designation applied to the great historic period between the times of classic antiquity and modern times. The beginning and close of this period are not very definite. It is usual, however, to regard the middle ages as beginning with the overthrow of the Western Roman Empire in the year 476; and there is a pretty general concurrence in fixing on the Reformation as the great event which brought this period to a close. It began with the rise of the Frankish upon the ruins of the ancient Roman Empire, and with the commencement of civilisation among the barbarous tribes which had taken possession of the former Roman provinces. In course of it, the different nations of modern Europe were formed, and their political and social systems developed. It was a period of much superstition, in connection with which much religious enthusiasm very extensively prevailed, manifested in many great religious endowments, in magnificent ecclesiastical buildings, in pilgrimages, and, above all, in the Crusades. In the earlier parts of this period, the Church was much occupied in the extension of its bounds in the north of Europe, where heathenism still subsisted, and the means employed were not always consistent with the spirit of Christianity. During the middle ages, the hierarchy acquired enormous power and wealth, and the papacy rose from comparatively small beginnings to its utmost greatness. During the middle ages, chivalry had its rise and decline, modifying, and in many respects tending to refine the feelings and usages of society. Towards the close of the middle ages, the revival of letters, the increase of knowledge, and the formation of a wealthy and influential class in society, distinct alike from the aristocracy and the peasantry, tended, even before the Reformation, both to the diminution of the power of the hierarchy and the decay of the feudal system. See Guizot's "Histoire de la Civilisation;" Rühn's "Handbuch der Geschichte des Mittelalters;" and Hallam's "History of the Middle Ages."

**MIDDLE BASE and MIDDLE CHIEF.** See **POINTS OF ESCUTCHEON.**

**MIDDLE LATITUDE SAILING.** See **SAILING.**

**MIDDLE LEVEL.** Under the heading **BEDFORD LEVEL**, a remarkable district, covering 400,000 acres, is described, bounding the Wash on all sides except seaward, extending landward nearly to Brandon, Cambridge, Peterborough, and Bolingbroke, and embracing portions of the six counties of Northampton, Huntingdon, Cambridge, Lincoln, Norfolk, and Suffolk. It nearly coincides in area with what is popularly known as the Fens. The whole region was, centuries ago, converted into an unprofitable marsh by repeated incursions of the sea, coupled with obstructions to the outward flow of the rivers Nene, Cam, Ouse, Welland, &c. Vast operations have been carried on ever since the time of Charles I., by digging new channels and outfalls, and employing windmills and steam-engines to pump the water from the marshes and ponds into these artificial channels. The Bedford Level is divided into the *North*, the *Middle*, and the *South Levels*, managed by commissioners, whose powers are derived from special acts of parliament. The improved value of the land is the fund out of which the expense of the engineering works is defrayed. It was in one of these districts (the Middle Level, between the Nene and the Old Bedford River) that an irruption took place in 1862, which strikingly illustrates the dependence of the safety of the whole region on well-formed and well-maintained embankments. There was a sluice, called St Germain's Sluice, situated at the con-

fluence of the Middle Level main outfall drain with the river Ouse, near the upper end of another artificial channel, known as the Ean Brink Cut. The drain was made in 1847, and was enlarged ten years afterwards to a bottom-width of 48 feet, a side-slope of 2 to 1, and a level of 7 feet below low-water spring-tide in the river; the rise of high-water spring-tide at that point was 19 feet, and the sill of the sluice was 6 feet below low-water spring-tide.

On the 4th of May 1862, this sluice gave way without the slightest warning; the tidal waters undermined the brick work, and formed a hole in the bed of the river, into which the works of the sluice sank. The tidal waters rushed up the opening, and ebbed and flowed throughout a distance of 20 miles. The commissioners of the Middle Level applied to Mr Hawkshaw, the engineer, to devise means for repairing the disaster. An earth and cradle-dam was attempted to be thrown across the drain, at about 500 yards from the fallen sluice; but this was relinquished in favor of a permanent coffer-dam of pile-work, at a distance of half a mile from the sluice; and after incessant exertions from May 16 to June 19, the tidal waters were at length effectually shut out by a strong dam. The failure of the St Germain's Sluice was not the only irruption that had to be battled with; eight days after that failure, under the pressure of a high spring-tide, the west bank of the drain gave way, on May 12, at a point about 4 miles from the sluice; the bank had been built only to resist upland waters, and not a rush and a pressure of the sea. The rupture carried away 70 yards of the bank, scouring out a hole 10 feet deep at the spot, and admitting a rush of water which covered 6000 acres of fertile land to a depth of 2 or 3 feet, increased at successive high-tides to 10,000 acres.

When the finishing of the dam had enabled Mr Hawkshaw to shut out the tidal waters, means had to be devised for getting rid of the flooding waters, and providing an outlet for the usual rivers and land-drainage of the Middle Level. It was resolved to utilise some of the old outlets at other spots, and to supplement their action by enormous syphons, placed over the coffer-dam. Sixteen syphons were provided. They were made of cast iron, 3 feet 6 inches internal diameter, and somewhat over 1 inch thick; they rested on the top of the dam, and on inclined framework supported by piles at the sides. The valves were so arranged, that the syphons could be put in operation, either by exhausting the air or by filling them with water. When only six of the syphons were in position, they carried 50,000 gallons of water per minute over the dam.—For more minute details of the dam and the syphons, see Mr Hawkshaw's paper read before the Institute of Civil Engineers in 1863.

There are large items both of cost and of compensation in works of this kind. Nearly the whole of the Middle Level is 15 feet below high-water spring-tides; it is difficult to keep out the sea-water, and at the same time to preserve an outlet for the land-water, especially Whittlesea Mere; there are 130,000 acres to be drained somehow or other; but as the land is rich for farming, the commissioners, in past years, did not hesitate to spend £200,000 on 11 miles of drain, and £30,000 on the sluice. The drain runs through a district called *Marshland*, between Lynn and Wisbeach; and as the bursting of the bank caused this district to be deluged with water, the commissioners have had to compensate the Marshland farmers and others; the amount of this compensation was frequently litigated between 1862 and 1867. As concerns the land itself, it is found to be more fertile after such inundations than before, owing to the amount of silt deposited on the fields. After repairing the breach in the bank, the 10,000 inundated acres were drained without much difficulty, through the Marshland, Smeeth, and Fen drain, and the Marshland sewer; the syphons are permanent channels, to carry off the usual land-waters regularly. The syphons were subjected to a severe trial in January 1867, by the ice which accumulated around their lower ends; but iron gratings effectually resisted the entrance of the ice into the syphons.

**MIDDLE TEMPLE**, one of the four English Inns of Court, having the exclusive privilege of calling persons to the bar. See **INNS OF COURT**.

**MIDDLESBROUGH**, the centre of the north of England iron manufacture, is an important market-town, port, and parliamentary borough in the North Riding of Yorkshire, at the mouth of the Tees, 48 miles n. e. from York, returning one member to parliament. The town is of recent growth, and owes its origin as a port to its convenient position for the shipment of coals brought down by railway from the mines in South Durham. In 1842, a commodious dock was constructed,



which has recently been very considerably enlarged, and will admit ships of the largest tonnage.

On the discovery, in 1840, of immense beds of ironstone, extending throughout the whole range of the Cleveland Hills, a portion of which lies close to the town, the smelting of iron was speedily embarked in on an extensive scale, which has since increased to a marvellous extent, to which has been added iron-foundries, the manufacture of rails, locomotive engines, tubes, boilers, &c., chemical works, potteries, and ship-building are also carried on to a large extent. The town of M. was incorporated in 1853, and constituted a parliamentary borough in 1869, is well built, and some of the streets present handsome specimens of architecture. The Royal Exchange, built in 1867, is a large and handsome building; within its spacious interior, the weekly iron market is held on Tuesdays, and is attended by parties connected with the iron trade from all parts of the kingdom, as well as foreigners. There are five churches of the national establishment, and numerous places of worship connected with the various religious denominations. Albert Park, containing 72 acres, is tastefully laid out.

At the census taken in 1831, M. was an obscure hamlet with 383 inhabitants; in 1871, the parliamentary borough contained a pop. of 46,643, and in 1874 it was estimated at upwards of 60,000.

**MIDDLESEX**, the metropolitan county of England, in the south-east of the country, bounded on the north by Hertford, and on the south by Surrey, and about 60 miles inland (westward) from the North Sea, with which it communicates by the river Thames. Next to Rutland, it is the smallest of the English counties, its area being only 180,186 statute acres; but its population is inferior only to that of Lancashire, and was, in 1871, 2,539,756. The surface is on the whole level, with gentle undulations. The Thames, which forms its southern boundary, and its affluents, are the only rivers of the county. Two of these, the Colne and the Lea, form respectively the western and the eastern boundaries of the county. The surface is also traversed by the Grand Junction and Regent's Canal, and the New River, an artificial cut intended to supply the capital with water. The soil is in general poor, with the exception of a tract along the banks of the Thames, which consists of a good fertile loam. The county is chiefly occupied in grass and hay farms, and in market-gardens, the produce of which is sent to supply the metropolis. Parliamentary elections of members for Middlesex are held at Brentford, which is the county town. There are no other towns of importance except London.

**MIDDLETON**, a small manufacturing town of Lancashire, six miles north-east of Manchester. Pop. (1861) 9976; (1871) 14,587. It is chiefly dependent upon its manufactures of cotton cloth and silks.

**MIDDLETON**, a small decaying market-town of Ireland, in the county of Cork, and 18 miles by railway east of the city of that name. It contains a college founded in 1696, noticeable as the place in which John Philipot Curran was educated, and still of considerable reputation, and carries on a general trade. Pop. (1871) 3008.

**MIDDLETON**, Conyers, D.D., a well-known divine and scholar of the Church of England, was born in 1633, at Richmond, in Yorkshire. He studied at Cambridge, where he took the degree of B.A. in 1702, was elected a fellow in 1706, and shortly after married a lady of fortune. His life was a series of bitter, and, on the whole, not very creditable controversies, though he is said to have been rather a likeable person in private. His first and most formidable opponent was Richard Bentley (q. v.); afterwards, his polemics were chiefly of a theological character. The views he expressed and defended were generally such as to draw down upon him the imputation of being an "infidel in disguise," though some of them—such as that the Jews borrowed some of their customs from Egypt, and that the primitive writers in vindicating Scripture found it necessary sometimes to recur to allegory—are now established beyond all doubt; while a third opinion, viz., that the Scriptures are not of absolute and universal inspiration, has since M.'s day been adopted by many of the most learned and accomplished divines even of his own church. M. died at Hildersham, in Cambridgeshire, July 25, 1750. His principal writings are "The History of the Life of M. Tullius Cicero" (2 vols. 1741), a work both interesting and valuable, but neither very impartial nor quite accurate. His celebrated "Letter from Rome, shewing an exact Conformity between Popery and

Paganism; or the Religion of the present Romans derived from that of their Heathen Ancestors" (1759), provoked the most violent indignation among Roman Catholics, and is still read with interest. All his pamphlets, treatises, &c., were collected and published under the title of "Miscellaneous Works" (4 vols. Lond. 1752—1757), and contain much that is curious and valuable on theological and antiquarian topics.

**MIDDLETOWN**, a city and township in Connecticut, United States of America, at the head of navigation, on the right bank of the Connecticut River, 23 miles from its mouth. It is a well-built town, with a handsome custom-house, Wesleyan university, episcopal seminary, 16 churches, 4 banks, 8 cotton factories, foundries, mills, &c. Pop. of city in 1870, 6928; (1880) 6,826.

**MIDDLEWICH**, a small market-town of England, Cheshire, on the Grand Trunk Canal, 20 miles east of Chester. Salt is extensively made; boat-building is carried on, and brick-works are in operation. Pop. (1871) 3085.

**MIDGE**, the common name of many species of small dipterous insects, of the family *Tipulidæ*, much resembling gnats, but having a shorter proboscis. Their larvæ are aquatic; the perfect insects are often very annoying both to human beings and to cattle. The little pink-colored tortuous worm known to anglers as the *Blood-worm*, frequent in water-barrels and in the mud near the edges of ponds and ditches, is the larva of a species of *M.* (*Chironomus plumosus*), a little larger than the common gnat, very abundant in Britain, particularly in marshy situations. The larva is much sought after both by birds and fishes, and is a very tempting bait for the latter. The pupa is cylindrical, with respiratory organs on the sides of the thorax. When the insect is ready to quit its pupa case, it rises to the surface of the water, and there remains suspended for a short time; the perfect insect, when it has issued from the case, also stands for a short time on the surface of the water. The genus is remarkable for the long hairs with which the antennæ of the male are furnished.—Another genus of Midges (*Simulia*) contains many species which are most tormenting to men and cattle, by entering the ears and nostrils, and alighting on the eyelids. Several species are British. They swarm on marshes and damp heaths in the warmer months. But none of them is nearly so mischievous as a species (*S. columbaschensis*) found on the banks of the Danube, and so plentiful, that horses and cattle are often suffocated by the numbers which get into the wind-pipe.

**MIDHURST**, a market-town and parliamentary borough of England, in Sussex, on the Rother, a navigable tributary of the Arun, 60 miles south-west of London. Here are the ruins of an old castle of the Bohuns, lords of *M.*; and within half a mile east of the town stood Cowdry House, the seat of the Montagues, which, with the exception of the gate-house, was burned down in 1798. *M.* returns one member to parliament. Pop. (1861) of parliamentary borough, 6406; (1872) 6768.

**MIDIANITES**, an Arab race, descended, according to Scripture, from Midian, the son of Abraham by Keturah. They occupied the greater part of the country between the north side of the Arabian Gulf and Arabia Felix as far as the Plains of Moab. Others more civilised (if not, indeed, of Cushite origin) dwelt in the vicinity of the Sinaitic peninsula, and carried on a trade, particularly with Egypt. To the latter, we may presume, belonged Jethro, priest or "sheik" of Midian—the father-in-law of Moses. The *M.* were very troublesome neighbors to the Israelites till Gideon's victory over them. Their national god was Baal-Peor.

**MIDRASH** (Heb. *darash*, to search, explain the Scriptures) is the general name given to the exposition of the Old Testament, which, for about 1500 years, formed the centre of all mental activity, both in and out of the schools, among the Jews after the Babylonish exile. The prohibitions and ordinances contained in the Mosaic records, to which a precise meaning was, not in all cases, attached, were, according to certain hermeneutical rules, specified and particularised, and further surrounded by traditional ordinances and inhibitions: Halacha (q. v.) = rule by which to go, or the binding, authoritative, civil, and religious law. The chief codes of this are the Mishna (q. v.), Gemara (q. v.), Sifra (an amplification on Leviticus), Sifri (on Numbers and Deuteronomy), and Mechilta (on a portion of Exodus). Another branch of the Midrash, however, is the Haggada (q. v.), a kind of free poetical homilectics on the whole body of the Old Testament (the Halacha being chiefly

## Midshipman Midwife

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confined to the Pentateuch). The chief collections of that part of the Midrash are *Midrash Rabba*, 700—1100 A.D. (on Pentateuch and Megilloth), and *Pesikta* (700), the extracts from which (Jalkut, *Pesikta Rabbati*, *Sutarta*, &c.) only are known, the original itself never having been printed.

**MIDSHIPMAN**, the second rank attained by combatant officers in the royal navy. After two years' service as naval cadet, the aspirant becomes a midshipman, which is rather an apprenticeship for his after-naval career than any really effective appointment. The midshipman's time is principally devoted to receiving instruction, both in the ordinary subjects of a gentleman's education, and in the special professional duties of a naval officer. After 1½ year's service as such, the midshipman is required to pass a qualifying examination in geography, history, and general knowledge; and, two years later, he must pass in French conversation, and in seamanship, steam, and gunnery. He then becomes a Sub-lieutenant (q. v.); and if 19 years of age, is eligible for promotion to lieutenant, whenever opportunity offers.

A midshipman only receives 1s. 9d. a day (£31, 18s. 9d. per annum); he is consequently dependent on his friends for more or less pecuniary assistance until he becomes a sub-lieutenant.

**MIDSUMMER DAY**, one of the four English quarter-days for payment of rent by tenants, viz., 24th June. See **LANDLORD AND TENANT**.

**MIDSUMMER EVE**. See **JOHN'S (ST) EVE**.

**MIDWIFE, MIDWIFERY**. Midwife (Anglo-Saxon, *med-wif*, meaning probably a woman hired for *medic*, or reward) is the name applied to a woman who assists in parturition or delivery. From this is derived the term *Midwifery*, for that department of medical science which concerns itself with delivery, and its allied subjects. Writers who prefer words derived from Latin and Greek roots to such plain old English words as midwifery, have substituted for it *Obstetrics* (Lat. *obstetriz*, a woman who stands near, a midwife), and *Tokology* (Gr. *tokos*, child-birth), or *Gynaecology* (Gr. *gynē*, woman); for a male practitioner in this line of the medical art, the French name *accoucheur* is used; and recently, an obnoxious new verb, to *accouch* (Fr. *accoucher*, to deliver a woman), has made its appearance in medical literature.

Midwifery, as a branch of medical science, is understood to include the study of the anatomy of the parts of the female body concerned; the doctrine of conception and of sterility, and the signs and duration of pregnancy; parturition in all its varieties; and the diseases peculiar to the puerperal state. To enter into details of such matters, would be out of place in this work. With regard to parturition itself, it may be interesting to remark, that in a vast majority of cases the labor is what is called "natural," that is, the child presents itself in the normal position, and unaided nature completes the delivery within twenty-four hours with safety to the mother and child. Dr Smellie calculated that 990 in 1000 are "natural" labors; and the later statistics of Dr Collins, based on 15,850 cases, give a similar result—viz., 963 in 1000.

"Unnatural" labor arises either from malformation, disease, or weakness on the part of the mother, or from abnormal conditions of the child; and manual or instrumental aid becomes necessary to prevent the labor from being dangerously prolonged, or—in the more extreme cases—to render delivery at all possible. Of instrumental applications, by far the most important and frequent is that of the Forceps (q. v.), which is not intended to injure either mother or child. In 123,295 cases of labor attended by British practitioners, there were 342 forceps cases, or 1 in 360; of these, about 1 in 21 proved fatal to the mother, while 1 child in 4 was lost. In Craniotomy, the head of the child is intentionally destroyed, with a view to save the life of the mother, the death of both being otherwise inevitable. Among British practitioners, this operation is not often resorted to; it proves fatal to about one mother in 5½. See also **CÆSAREAN OPERATION**.

**History**.—From all the passages in the Scriptures where midwifery is referred to, it is plain that women were the only practitioners of this art amongst the Hebrews and the Egyptians (see Gen. xxxv. 17, and xxxviii. 28, and Ex. i. 15—21), and it is equally certain that the Greeks and Romans confided this branch of medicine to women. Phænarete, the mother of Socrates, was a midwife; and Plato explains the

functions and mentions the duties undertaken by these women. The Greek and Roman physicians were not ignorant of midwifery, for Hippocrates refers to the necessity of turning the child in certain cases, although his doctrines on this point, as also on the management of the placenta, are replete with danger; and Celsus, nearly four centuries later, treats of the mechanism of labor with great clearness. A gradual increase in the knowledge of this subject may be traced in the writings of Aëtius and Paulus Ægineta, who advocates the operation of craniotomy in certain cases. Rhazes seems to have been the first to advocate the rupture of the membrane, when, by their toughness, they impede labor; and Avicenna gave the first description of an instrument partially resembling the more modern forceps.

At the commencement of the 16th c., Eucharius Rhodion published a little book, which soon acquired a great celebrity. It was translated from the original High-German into Latin, French, and English, and is remarkable as being the first book published on this subject in England. Its title is, "The Byrth of Mankynde, otherwise named the Woman's Book," by Thomas Raynold, Physician (London, 1540), and it contains no external evidence that it is a mere translation. In 1573, Ambrose Paré published a small work, in which he shewed that foot-presentations were not dangerous, and that in mal-presentations it was better to deliver by the feet than to attempt to bring down the head.

In the early part of the 17th c., the *sage-femme* (the French term corresponding to our English midwife) of Marie de Medicis published a collection of observations on midwifery. About this time (probably about 1640), Dr Paul Chamberlen, an English physician, invented\* the forceps with separate blades, such as are now used. The Chamberlen family (the father and three sons) did not, however, publish their discovery; considering that they had a right to use the secret in the way most to their own advantage; and the exact nature of their instruments was not known till 1815, when the tenant of a house near Maldon, in Essex, where Dr Peter Chamberlen, one of the sons, had resided more than a century previously, accidentally discovered a concealed space, in which were, *inter alia*, a collection of obstetric instruments, including a double-bladed forceps and a vectis, which are now in the possession of the London Medico-Chirurgical Society. Although Chamberlen's celebrated *arcanum* was doubtless the double-bladed forceps, he seems, therefore, also to have been the discoverer of the vectis or lever. In 1668, Mauriceau's *Traité* appeared, which ran through seven editions, and was for a long time the standard work on the subject. He gives a very full account of the process of labor; and his book having been translated into English, in 1672, by Hugh Chamberlen, became widely known in this country. This seems to have been the time when men began to engage generally in the practice of midwifery; Harvey, the Chamberlens, and others, taking it up in England; while La Vallière, the mistress of Louis XIV., did much to establish the practice in France, by employing Julian Clement, a surgeon of high reputation, in her first confinement in 1663.

The last point requiring notice in the history of midwifery in the 17th c., is the discovery of the use of ergot of rye in accelerating parturition. In 1688, Camerarius stated that midwives in some parts of Germany were in the habit of employing it for this purpose; but it is not till 1774 that we find any further reference to the use of this drug.

In the early part of the 18th c., different varieties of forceps, closely resembling Chamberlen's instrument, were invented by Giffard, Chapman, and others; Chapman being, as it is believed, the first public teacher of midwifery in London. About the middle of this century, lived Sir Richard Manningham, who devoted himself to this branch of the profession, and established a small hospital for the reception of parturient women, which was the first of the kind in the British dominions. It is scarcely necessary to enter into further historical details, as midwifery was by this time fully recognised as a branch—although then and long subsequently, considered as the lowest branch—of medicine. The names of Smellie, William Hunter, Denman, and Bland in England, and of Astruc and Baudelocque in France, are well-

\* The exact date of this important invention is not known, but in 1647, Dr Peter Chamberlen published a pamphlet entitled "A Voice in Rhama," in which he speaks of his father's (Dr Paul Chamberlen) discovery for the saving of infantile life. Hence the forceps must have been invented in the first half of the 17th century.

known as promoters of various departments of the art of midwifery towards the close of this century.

In the present century, the art of midwifery has steadily progressed. The by-laws precluding practitioners in midwifery from the Fellowship of the London College of Physicians, and other equally offensive rules in other institutions, have been repealed; there are professors of, or lecturers on midwifery in all our medical schools (excepting at the universities of Oxford and Cambridge); and a knowledge of this department of medicine is now required from every candidate for the medical profession. And not only are the members of the medical profession compelled to be as well versed in midwifery as in medicine or surgery, but the ignorant midwives of past times are now replaced by comparatively well-educated nurses, with diplomas, certifying that they have regularly attended lectures on midwifery, and have taken personal charge of a certain number of labors, under the superintendence of a qualified teacher. And that properly educated women are capable of undertaking all the responsibilities of this department of practice, is shown by such cases as those of Mesdames Boivin and Lachapelle, who (to use the words of Professor Velpeau), "although the pupils of Bandelocque, were not afraid to shake off, to a certain extent, the yoke of his scientific authority, and whose high position and dignity form the starting-point of a new era for the science of obstetrics in Paris."

**MIGNET**, François Auguste Alexis, a French historian, was born 8th May 1796, at Aix in Provence, studied law in his native city along with Thiers, and went to Paris in 1821, to devote himself to a literary life. He found employment in writing for the public journals, and having given lectures on Modern History, which were received with great approbation, he was induced to write his "*Histoire de la Révolution Française* (2 vols. Par. 1824; 10th edition, 1840), a work in which that great event is regarded less in its moral than its philosophical aspects. It has therefore been reproached with leading to fatalism. His style is brilliant, but academic. After the revolution of 1830, he became a Counsellor of State, and Keeper of the Archives of the Ministry of Foreign Affairs; but lost these offices in 1848, since which time he has lived in retirement. He has edited "*Négociations relatives à la Succession d'Espagne sous Louis XIV.*" (4 vols. Par. 1836—1843), to which he prefixed a masterly historic introduction. Among his later works are "*Histoire de Marie Stuart*" (2 vols. Par. 1851), and "*Charles Quint, son Abdication, son Séjour et sa Mort au Monastère de Yuste*" (1854); "*Eloges Historiques*" (1864); and "*Rivalité de François I. et de Charles V.*" For a "*Histoire de la Réforme, de la Ligue et du Règne de Henri IV.*," he is said to have collected hundreds of volumes of manuscript correspondence.

**MIGNONETTE** (*Roseda odorata*), a plant of the natural order *Rosaceæ*, a native of the north of Africa, in universal cultivation on account of the delicious fragrance of its flowers. It is, according to circumstances and the mode of cultivation, an annual or a perennial, and even half-shrubby plant, with lanceolate entire or trifid leaves, and erect terminal racemes of small whitish flowers, which have the calyx 6-parted, and as long as the corolla; the capsules 3-toothed. It is to be seen during summer in almost every garden, and during winter in almost every greenhouse in Britain; it is often cultivated in flower-pots in apartments, and no flower is so common in the boxes which are placed outside of windows in towns. Yet it was first introduced into England by Lord Bateman, who brought it from the Royal Garden at Paris in 1782; nor had it then been long known in France. It rapidly became a universal favorite throughout Europe. The French name *M.*, now its popular name everywhere, signifies *Little Darling*. What is called *Tree M.* is not even a distinct variety, but merely the common kind trained in an erect form, and prevented from early flowering by plucking off the ends of the shoots.—Weid (q. v.) belongs to the same genus.

**MIGRATIONS OF ANIMALS**, which must not be confounded with their diffusion over a more or less extended area, are apparently always guided by an instinct operating on all, or nearly all, the individuals of a species, and leading them to move in a definite direction in search of food or (in the case of fishes) of a fit position for spawning.

Among mammals, such migrations are comparatively rare. The most remarkable instance is that of the Lemmings, which at no definite epoch, but generally

once or twice in a quarter of a century, traverse Nordland and Finmark in vast hosts, ending their career in the Western Ocean, into which they enter, and come to a suicidal end; or, taking a direction through Swedish Lapland, are drowned in the Gulf of Bothnia. M. Martins, who was a member of the great scientific Scandinavian expedition, seems to doubt the generally entertained view of these animals casting themselves into the Western Ocean, and believes that most of them perish from the cold in crossing the rivers, while many are killed by dogs, foxes, and a species of Horned Owl (*Strix brachyotos*) which in large numbers always accompanies these emigrations.

According to Gmelin, the Arctic Fox (*Fulpes lagopus*) always accompanies the lemmings in such numbers that, on this ground, it is entitled to be considered a migratory animal; but independently of these special migrations, it is stated by Sir James Ross that "the young generally migrate to the southward late in the autumn, and collect in vast multitudes on the shores of Hudson's Bay; they return early the following spring to the northward, and seldom again leave the spot they select as a breeding-place."

The Spring-bok (*Antidorcas Kuchore*) is accustomed to make pilgrimages from one spot to another in the vast plains of Southern Africa. Herds of many thousands are led by their chiefs in these migrations, and the wonderful density of the moving mass may be imagined from the fact, that a flock of sheep has been inextricably tangled and carried along without the possibility of escape. Want of water is said to be the cause of these migrations, but Dr Livingstone thinks that there must be other causes.

The occasional incursions of wolves, in very severe winters, into districts in which they are not commonly found, and the long excursions of large groups of monkeys (*Entellus* and *Rhesus*), hardly fall within the scope of this article.

Many of the cetacea are probably migratory. "The migrations of the Porpoise (*Phocaena communis*) appear—says Marcel de Serres in his prize-essay, "Des Causes des Migrations des divers Animaux," p. 63—to be as periodic as those of certain species of birds. During the winter, they constantly proceed from north to south; and when they feel the warmth of summer, they turn northwards. Thus they are common in summer in Greenland, while they are rare on our own coasts, where they abound in winter."

The number of species of birds that periodically migrate is so great that it is impossible to find space for a list of them. Marcel de Serres, in the work already quoted, gives a "Tableau de l'Epoque des Passages des Oiseaux," which extends over nearly 100 pages. See BIRDS OF PASSAGE. The desire for a suitable temperature, and the search for their proper food, are the apparent causes stimulating birds to these migrations; and in most instances, especially in the case of insectivorous birds, the food is intimately associated with the temperature.

The migrations of many species of fishes are as remarkable for their regular periodicity as those of birds. In some cases, fishes that are produced in fresh-water streams migrate to the ocean, and after spending some time in salt water, return (generally, with singular instinct, to their own birthplace) to fresh water to propagate their species. Some of these fishes—as, for example, the Lamprey (*Petromyzon marinus*)—spend most of their lives at sea, and others, as the salmon, in fresh water. The remarkable migrations formerly, but erroneously supposed to be made by herrings, are noticed in the article on that fish. Many fishes of the same family as the herring, the *Clupeidae*—as, for example, the sprat and pilchard—leave the deep sea for shallow water during the spawning period, when they approach our coasts in vast shoals. All such migrations as these seem mainly due to a reproductive impulse. See FISHES, LAND-CRAB.

Amongst insects, the Locust (*Locusta migratoria*) is most remarkable for its migrations. These insects are probably produced much more abundantly some years than others, and as in such years their birthplace cannot afford them sufficient vegetation, they are led to migrate in search of food. Some idea of the occasional extent of their wanderings may be formed from the fact that, in the early part of 1816, myriads of locusts appeared in Bengal, from whence they proceeded westward completely across the great Indian peninsula to Guzerat and the neighboring provinces, from whence they pursued their course southwards towards Bombay, the whole period of their migration extending over between two and three years; while,

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in relation to their numbers, Captain Beaufort calculated a swarm that appeared at Sardinia, in Asia Minor, in 1811, at upwards of 168,000,000,000,000.

**MIGUEL**, Dom Maria Evarist, born at Lisbon 26th October 1802, was the third son of John VI. of Portugal. He spent his early years in Brazil, unrestrained and uneducated. When he returned with the royal family to Portugal in 1821, he could neither read nor write, and shewed no talent for anything but fencing. He joined his mother, Charlotte Joachime of Spain, in her plots for the overthrow of the constitution and the establishment of a despotic government; part of the scheme being, that his weak father should be either formally deposed, or virtually deprived of all power. The aged Marquis of Loulé, the faithful servant of the king, having been removed out of the way by assassination, M., as Infant-generalissimo, caused the ministers to be arrested, 30th April 1824, and his father to be closely watched in his palace; but the plot failed, and M. and his mother were banished. He led for some time a remarkably wild and profligate life in foreign countries. After the death of his father in 1826, the queen's party set forth a claim to the throne on his behalf, as his elder brother, Dom Pedro, was emperor of Brazil; and on 2d May 1826, Pedro resigned the crown of Portugal in favor of his eldest daughter, Donna Maria da Gloria, proposing that her uncle Miguel should be her husband, and regent of the kingdom till her majority, to all which M. agreed. But Queen Johachime's party had everything prepared for the restoration of absolutism. M. was declared king of Portugal. War ensued, and at first M. was victorious. He carried into full effect the principles of his party by a system of the most severe repression of all liberalism, and signalised himself by the most extreme tyranny of every kind, whilst his own life was one of the wildest excess. In 1832, Dom Pedro took Oporto, and his arms gradually prevailing, M. was obliged to sign a capitulation at Evora, on 26th May 1834, by which he resigned all claim to the throne of Portugal, and agreed to retire altogether from the country. But scarcely had he been conveyed to Genoa, when he protested against this deed, and consequently all his estates in Portugal were confiscated, and an annual pension which had been secured to him was stopped. He went to Rome, where the papal government acknowledged him as rightful king of Portugal, solely because he had petted the Portuguese priesthood in his war against the national liberties. Latterly he lived at the castle of Brounbach, in Baden, where he died Nov. 1866.

**MIKLOSICH**, Franz, the most learned living Slavist, was born at Lutzenberg, in the Slavic part of Styria, 20th November 1818. After studying law at the university of Grätz, he went, in 1838, to Vienna to practise as an advocate; but in 1844 obtained a situation in the Imperial Library. In 1860, he was appointed Professor of Slavic in Vienna. His principal works are—"Radices Lingue Palæoslovenicæ" (Leip. 1845); "Lexicon Lingue Palæoslovenicæ" (Vienna, 1850); "Vergleichende Grammatik der Slaw. Sprachen" (1852—1871), a work which has done for Slavic what the works of Grimm and Diez have done for German and Romanic. "Die Bildung der Slaw. Persouennamen" was published in 1860; and "Die Zigeuner Europas" in 1872—77.

**MIK'NIA**, a genus of plants of the natural order *compositæ*, nearly allied to *Eupatorium* (q. v.). The heads of flowers are 4-flowered, and have four involucrel leaves. *M. officinalis* is a Brazilian species, with erect stem, and heart-shaped leaves, abounding in a bitter principle and an aromatic oil, and valuable as a tonic and febrifuge. *M. Guaco* and *M. optifera*, also natives of the warm parts of South America, are among the plants which have acquired a high reputation—deserved or undeserved—for the cure of snake-bites. They are twining herbaceous plants. *M. Guaco* is remarkable for the large indigo-blue spots on the under side of its ovate leaves. The mode of using this plant, which is one of those called *Guaco*, or *Huaco*, by the Indians, is by dropping the juice of the fresh leaves into the wound made by a serpent; or little cakes are formed of the bruised plants, which are said to retain their power for a long time. The whole subject requires investigation.

**MI'KLOS** (Sr) **TOROK**, a town of Hungary, in the county of Heves, near the Theiss, about 70 miles south-east of Pesth, with which it is connected by railway. Pop. (1869) 13,024, chiefly employed in rearing horses and cattle, and in fishing.

**MI'KNAS**, Mc'quinez, or Meknazza, a town in the province of Fez, in Morocco, 33 miles west-by-south from the town of Fez, stands in a fertile valley near the Sebou.

It is surrounded by triple walls and a moat, is neat and well built, and contains the finest imperial palace in Morocco. This vast pile, erected by the Sultan Muley Ismail, is built of marble, and the surrounding grounds are laid out in gardens, said to be the most beautiful in Morocco, and here and there adorned with fountains. M. is the summer residence of the sultan. Pop. estimated at from 15,000 to 55,000, who carry on an extensive trade in native produce. The chief manufactures are of painted earthenware and leather. In the vicinity are large plantations of olives.

MILAN (Ital. *Milano*), the chief city of Lombardy, stands on the river Olona, in the centre of the great plain of Lombardy. Pop. (1872) of city, 199,009; of surrounding district, called *Corpi Santi*, 62,976. From its position on the line of the chief routes of the central Alps, it derives great commercial advantages, while its fine canal system opens for it communication with the principal rivers of Italy. The *Naviglio Grande*, or Grand Canal, connects M. with the Ticino, and the Martesana Canal with the Adda. The city, which is almost circular, is encompassed on three sides by walls and low ramparts; it has a circuit of about 7½ miles, and is entered by 10 gates. Notwithstanding its great antiquity, M. possesses but few remains of its early splendid structures, in consequence of the many calamitous wars by which it has been ravaged. Modern M. is one of the most opulent and populous cities of Italy; its best streets are regular, wide, and well paved, and kept with scrupulous care; the dwellings are commodious and tasteful, though of a less imposing character than the great feudal Tuscan houses. M. abounds in churches worthy of note: of these, the principal is the famous Gothic cathedral, the *Duomo*, which, with the exception of St Peter's in Rome, is the most magnificent ecclesiastical structure of Italy. It has a façade of white Carrara marble, and is adorned by 106 pinnacles, and 4500 statues, besides a variety of carvings of unsurpassable beauty. In form, it is a Latin cross, with a length of 485, and a breadth of 252 feet. The height of the dome is 355 feet. Its foundation was laid in 1386 by Gian Galeazzo Visconti, and during its erection, many of the greatest European architects contributed designs for its embellishment. Within it, Napoleon was crowned king of Italy in 1805. Besides the *Duomo*, may be mentioned the church of St Ambrose (founded by that saint in the 4th c.), the most ancient in M., containing inscriptions, sarcophagi, and monuments full of antiquarian interest, and the one in which the German emperors were crowned kings of Italy; the Dominican church of *Santa Maria delle Grazie*, which contains in its refectory the famous "Cenacolo," or "Last Supper," by Leonardo da Vinci; and that of San Carlo Borromeo (1847); of St Nazaro, which possesses several master-pieces of the best schools of Italian art; and of St Sebastiano, once a Roman temple.

Among the secular buildings of M., the most noteworthy is the magnificent Brera Palace, formerly a Jesuit college, and now used for public schools of the fine arts, with the official name of Palace of Arts and Sciences. Within its vast precincts, this unique institution includes an academy of art, a choice gallery of paintings, of the Bolognese and Lombard schools, a fine collection of casts for modelling purposes, a splendid public library, containing 140,000 volumes, and a rare collection of manuscripts, medals, and antiquities; it has also attached to it an observatory and a botanical garden. Besides the Ambrosian (q. v.), there are several large private libraries. Among the scientific and artistic institutions of M., are the Museum of Natural History, the schools of surgery and medicine, especially that of veterinary practice, the celebrated Conservatory or school of music, and a military geographical institute, well known for the excellence of the maps it has issued. The educational establishments include four gymnasia, besides normal schools, technical schools, conventual schools, and a seminary. The charitable institutions are numerous and splendidly endowed, having an aggregate property of upwards of £7,000,000 sterling; the *Ospedale Maggiore*, or Great Hospital founded by the ducal house of Sforza in 1456, accommodates 2000 patients, and annually admits upwards of 20,000. The Trivulzi Hospital, endowed by the Trivulzio family, maintains and clothes 600 aged pensioners. The Milanese places of amusement are on as grand a scale as the other public buildings of the city, the first in point of celebrity being the theatre of *La Scala*, which can accommodate 3600 spectators. The *Corso*, or chief street of M., is the universal fashionable promenade of the inhabitants; and the famous arcade, or *Galleria di Cristoforis*, with its brilliant shops and cafés, is also a favorite place of evening resort, and on account of its gay



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appearance has been called "Little Paris." M. carries on an immense inland trade in silk, grain, rice, and cheese, and has considerable manufactures of silk goods, ribbons, cutlery, and porcelain.

M. (Lat. *Mediolanum*) was originally a town or village of the Insubrian Gauls. It was conquered by the Romans 223 B.C., received the Latin franchise about 89 B.C., and the full Roman franchise 49 B.C. Under the Romans, it became a conspicuous centre of wealth and civic influence; its citizens were noted for their refined manners and literary tastes, and the public buildings for their beauty and elegance. In the beginning of the 4th c., it was selected as the residence of the Imperial court by Maximian. M. was sacked by the Huns (under Attila) in 452, by the Goths (under the brother of Vitiges) in 539, and passed to the Longobards and Franks previous to its subjection by the German empire. After 961, it was long governed by dukes in the name of the emperors. The feuds of the Guelphs and Ghibellines distracted M., like all the other Italian cities. Supreme power became eventually vested in the Ghibelline Visconti, by whom the ascendancy of M. was extended over the whole of Lombardy. From 1545 to 1714, M. submitted to the successive predominance of France and Austria. Under Bonaparte, it was declared the capital of the Cisalpine Republic, of the Italian Republic, and, finally, of the Kingdom of Italy. In 1815, M. was restored to Austria, and continued the capital of the Austro-Italian kingdom until the annexation of Lombardy to Piedmont, in 1859, by the peace of Villafranca.

MILAZZO (anc. *Mylæ*), fortified seaport on the north coast of the island of Sicily, 18 miles west of Messina. Pop. (1872) 7744. Its situation is unhealthy. The chief exports are tunny, wine, silk, fruits, corn, oil, and liqueurs. The town is irregularly built, and is considered almost impregnable, owing to the great natural strength of its position and the extent of its military works and citadel. Garibaldi, with 2500 men, defeated 7000 Neapolitans here on the 20th of July 1860, and compelled the garrison to evacuate the fortress.

MILDEW (Ger. *Mehlthau*, meal-dew), a term of somewhat vague application to certain diseased states of plants caused or characterised by the growth of small parasitical fungi, and also to spots on cloth, paper, &c., and even on the surface of glass and other inorganic substances, produced by the growth of minute fungi. The mildew fungi are numerous, and the name mildew is often given to many that are also known by other names, as BLIGHT, BRAND, BUNT, RUST, &c.; see these heads; see also BOTRYTIS and OIDIUM. Different species or families of plants have their own peculiar parasites; several kinds of parasitic funguses being, however, often known to infest one plant. Probably, the name mildew originally belonged to those moulds which form white mealy patches on leaves. Some of these belong to the genus *Erysiphe*, which exhibits fleshy somewhat gelatinous masses, becoming globose *sporangia*, filled with spore-containing *asci*, and surrounded by a fleshy *mycelium*, often spreading widely over the leaves and other parts of plants. Maples are sometimes covered with a mildew of this kind, so as to be quite hoary. Similar mildews are often seen on pease and other leguminous plants; also on umbelliferous plants. Sulphur has been found effectual in curing some of these mildews. Many of the most destructive mildews are of a red or brown color, as the mildew of the pear, *Aecidium cancellatum*, that of the barberry, *Aecidium Berberidis*, &c.; whilst some are almost black, as the corn mildew, *Puccinia graminis*, by which the crops are in some years greatly injured.

Whether mildew is the consequence of unfavorable weather and of fungi attacking an already weakened plant, or is the consequence of infection by spores of fungi brought through the air or soil to a plant previously healthy, is not yet well ascertained; and probably the one may be sometimes the case, and sometimes the other. There is no doubt that many kinds of mildew appear chiefly towards the close of summer on leaves in which vegetable life has already in a great measure lost its power.

MILE, the largest terrestrial measure of length in common use among the British and most continental nations, is derived from the Roman *milliare*, which contained 1000 paces (*mille passuum*) of 5 Roman feet each, the pace being the length of the step made by one foot. The Roman foot being between 11.65 and 11.62 English inches, the Roman mile was thus less than the present English mile

hy from 142 to 144 yards. The length of the modern mile in different countries exhibits a remarkable diversity, not satisfactorily accounted for. Before the time of Elizabeth, scientific writers made use of a mile of 5000 English feet, from the notion that this was the Roman mile, forgetting the difference in value between the English and Roman foot. The present statute mile was incidentally defined by an act passed in the 35th year of the reign of Elizabeth to be "8 furlongs of 40 perches of  $16\frac{1}{2}$  feet each"—i. e., 1760 yards of 3 feet each; and it has since retained this value. The *geographical or nautical mile* is the 60th part of a degree of the equator, and is employed by the mariners of all nations; but in Germany, the geographical mile denotes 1-15th part of a degree of the equator, or 4 nautical miles. The following table gives the length, in English statute miles, of the various miles that have been or are commonly used:

	Eng. Miles
English geographical mile.....	— 1-153
German geographical mile.....	— 4-611
Tuscan mile.....	— 1-027
Ancient Scotch mile.....	— 1-127
" Irish mile.....	— 1-273
German short mile.....	— 3-597
Prussian mile.....	— 4-680
Danish mile.....	— 4-684
Hungarian mile.....	— 5-178
Swiss mile.....	— 5-201
German long mile.....	— 5-753
Hanoverian mile.....	— 6-563
Swedish mile.....	— 6-648
The French kilomètre.....	— 0-621

and 29 kil. = 18 English statute miles nearly.

**MILETUS**, anciently, the greatest and most flourishing city of Ionia, in Asia Minor. It was situated at the mouth of the Meander, and was famous for its woollen manufactures, and for its extensive trade with the north. Before being forcibly colonised by the Ionians, it appears to have been inhabited by Carians. M. early founded a number of colonies on the Black Sea and in the Crimea, possessed a fleet, which sailed to every part of the Mediterranean, and even ventured into the Atlantic, and maintained long and expensive wars with the Lydian Kings. The "Milesians" were believed to be the purest representatives of the Ionians in Asia. After the conquest of Lydia by the elder Cyrus, it was subdued with the whole of Ionia. It continued, however, to flourish till it was excited to rebellion against the Persians in the Ionian war, and was destroyed 494 B.C. It was rebuilt, but never reacquired its former importance. M. has an honorable place in the history of Greek literature, being the birthplace of the philosophers Thales, Anaximander, and Anaximenes, and of the historians Cadmus and Hecataeus.

**MILFORD**, a parliamentary borough (contributory to Pembroke) and seaport of South Wales, in the county of Pembroke, on the north shore of the Haven of the same name, 7 miles east-north-east of St Ann's Head. The Haven is said to be unequalled as a harbor by any other in the world. It is formed by an estuary running inland for 17 miles to Langwin (which is easily reached by vessels of 2000 tons), and varying from 1 to 2 miles in breadth. It is protected from winds by a girdle of undulating hills, is deep (from 15 to 19 fathoms in most parts, while the spring-tides rise 25 feet), easy of access, and capable of anchoring the whole fleet of England in safety. Its distance, however, from the Channel, the highway of British commerce, is a serious disadvantage. The merits of the Haven have been recognised from the earliest times; but the rise of the town of M. may be said to have begun with the present century, when docks and quays, together with a mail-packet station for Ireland, a dockyard, ship-building slips, and an arsenal, were established here, only, however, to be removed in 1814. Since that time, with only occasional gleams of prosperity, M. has been in a declining condition; but the opening of the Milford Railway, and the construction of docks and wharfs, have given an impetus to its progress; though the trade of the place is little developed as compared with the capabilities of the haven and the mineral resources in the neighborhood. In 1875,

Milford  
Military

72

1262 vessels, of a burden of 268,804 tons, entered the port, and 1173, of 228,030 tons, cleared. Pop. (1871) 2536.

MILFORD, a village of Massachusetts, United States of America, 34 miles south-west of Boston, having 6 churches, a manufactory of machinery, and large boot and shoe manufactures. Pop. (1870) 9390; (1890) 9,810.

MILHAU, or Millau, a town of France, in the department of Aveyron, in a rich and fertile dale on the right bank of the Tarn, 55 miles north-west of Montpellier. During the 16th and 17th centuries, it was one of the strongholds of the Calvinists. Leather and gloves are manufactured, and there is a good trade in wool, timber, hides, cheese, and wine. Pop. (1876) 14,482.

MILITARY ACADEMY, Royal, an establishment at Woolwich, through which must pass all candidates for the Royal Artillery and Royal Engineers. The age for entrance is 17, and the vacancies are open to public competition. The pupils are denominated military cadets, and the parents or guardians have to make a considerable payment in regard to each, so long as they remain at the Academy; the annual charge for the son of a civilian being £120, that for the son of a naval or military officer less, according to the rank of the father. When the term of instruction—which comprises the subjects of a thorough general education, the higher mathematics, fortification, gunnery, and military duty—is completed, the cadets compete for the vacancies in the Engineers and Artillery, those who pass the best examination being allowed the refusal of the former corps. Those who obtain commissions in the Engineers proceed to Chatham for further instruction (with military pay, however) in their professional functions. The Artillery cadets at once join the Royal Artillery as lieutenants. The vote for the Royal Military Academy for the year 1876–1877 was £30,825, of which sum about three-fourths would be made up to the Exchequer by the payments for pupils and a contribution from the Indian government.

MILITARY ASYLUM, Royal, an educational government institution at Chelsea, near, but wholly distinct from, the Royal Hospital for Pensioned Soldiers. Its object is the suitable education for trade, &c., of 600 male children—generally orphans—of British soldiers. For these, there are a model school and an infant school, and the boys have a completely military organisation, with scarlet uniform, band, &c. As a result of their training, a large proportion of the pupils ultimately volunteer into the army. The school was originally established in 1808 by the late Duke of York, whence it is still commonly known as the "Duke of York's School." Originally a similar school for soldiers' daughters was included, but was not found to answer, and has been discontinued. Attached to the school is a training establishment for military schoolmasters, known as the Normal School. The total cost of the whole institution is about £11,500 per annum.

MILITARY FRONTIER (Ger. *Militärgrenze*), the former name of a narrow strip of land along the Turkish frontier of the Austro-Hungarian Empire. It had a special military constitution, and formed a separate "crownland." Of late, however, the peculiar constitutions of the M. F. have been abolished; portions of the territory have been incorporated with adjoining provinces; and since 1873 the remainder of the M. F., now officially termed the Croato-Slavonic Border-land, forms, along with Slavonia and Croatia, a dependence of the Hungarian Crown. The constitution, civil and military, is now accordingly similar to that of the other provinces of the Hungarian part of the Empire. The area of the M. F. was about 7500 square miles, and its pop. in 1869 was 699,300. The breadth of the territory once under this name is considerable towards the western extremity, but diminishes to only a few miles at the eastern. The surface has an average elevation of upwards of 2000 feet. All the important rivers flow eastward. The climate is severe in the highlands in the west, but mild in the lower districts towards Slavonia. Maize, wheat, oats, fruits, and vegetables are the principal productions.

The M. F. owes its origin as a crown-land to the necessity of having a permanent body of defenders on the borders during former wars, and especially during wars with the Turks. In the 15th c., the Austrians had gained from the Turks certain tracts of territory on the banks of the Save and Danube. These tracts they colonised, making it, however, a condition that the colonists must render military service.

against the Turks. Thus originated the Capitanate of Zengg, during the reign of Mathias Corvinus. The Warasdin Frontier originated in the same manner in the 16th, and the Banat Frontier in the 17th c. The constitution of the M. F., as it existed till 1873, has been thus described: "The military stations along the frontier serve a threefold purpose—the defence of the country, the prevention of smuggling, and the prevention of the spread of contagious disease into the territories of the Austrian empire. The inhabitants of this crown-land enjoy peculiar privileges. Their immigrant ancestors received only the temporary use of lands consigned to them; but in 1850, a law was passed making over the land to the occupiers as their own property. This right of property does not belong, however, to individuals, but to the family in a vulted sense. The oldest member of a family (called the *Hausvater*) is intrusted with the management of the land; his partner (the *Hausmutter*) ranks equal with him, and they each receive a double share of the profits for the year, as recompense for the management of the estate. A family of this sort is called a Border-house (*Grenzhaus*). All who are able to bear arms are sworn to the service from their 20th year. The soldier of the frontier, who is clothed as well as armed and supplied with ammunition by government, finds it his duty not only to watch and protect the frontier, but to preserve peace and order in the interior, and to go on foreign service when required. Only the smaller portion of the forces of the M. F. is retained in readiness for active service, while the remainder pursue their ordinary employments. To facilitate the accomplishment of the purposes aimed at by the M. F., the *cordon*, a series of guard-houses along the whole frontier, affording accommodation to from four to eight men, as well as larger ones, accommodating twelve men and a junior officer, has been instituted. Within this line are the officers' posts. Without announcing himself at the posts, no one is allowed to pass the boundary; and after permission is given, the passenger must remain a longer or shorter time at the quarantine establishment, in order that all introduction of disease may be prevented.

**MILITARY ORDERS**, religious associations which arose from a mixture of the religious enthusiasm and the chivalrous love of arms which almost equally formed the characteristics of medieval society. The first origin of such associations may be traced to the necessities of the Christian residents of the Holy Land, in which the monks, whose first duty had been to serve the pilgrims in the hospital at Jerusalem, were compelled, by the necessity of self-defence, to assume the character of soldiers as well as of monks. See JOHN (St), KNIGHTS OF. The order of the Templars (q. v.) was of similar origin. Those of Alcantara and Calatrava in Spain had for their immediate object the defence of their country against the Moors. These orders, as well as that of Avis in Portugal, which was instituted with a similar view, followed the Cistercian rule, and all three differed from the Templars and the Knights of St John in being permitted by their institute to marry once. The same privilege was enjoyed in the Savoyard order of Knights of St Maurice and the Flemish order of St Hubert. On the contrary, the Teutonic Knights, who had their origin in the Crusades (see GRAND MASTER), were bound by an absolute vow of chastity. With the varying conditions of society, these religious associations have at various times been abolished or fallen into disuse; but most of them still subsist in the form of orders of knighthood, and in some of them, attempts have recently been made to revive, with certain modifications, the monastic character which they originally possessed.

**MILITARY SCHOOLS**, as regards the British army, are divisible into several classes: 1. Those for the education of officers already in the service; of these, there are the Staff College (q. v.), and the establishment at Chatham for training Engineer officers. 2. Professional schools common to officers and men will be found under GUNNERY, SCHOOL OF, and MUSKETRY, SCHOOLS OF. 3. Schools for the professional education of candidates for commissions; for these, reference should be made to MILITARY ACADEMY, ROYAL, and to SANDHURST MILITARY COLLEGE. 4. The schools for men in the ranks and for their children are described under SCHOOLS, REGIMENTAL; while the instruction provided for their sons or orphans is shown under MILITARY ASYLUM, ROYAL.

The Military Schools of foreign countries deserve considerable attention, especially those of France, where a military commission is one of the best scho-

lastic prizes looked forward to. In France, no attempt is made to impart general education at the military seminaries; a boy is required to have a thorough general knowledge before he can be admitted to these institutions. Being open to universal competition, and being the only channel—or nearly so—to the best employment under the state, the great military schools, by the high standard required for them, give great impetus to general education throughout the empire, and the Lycées, or public schools, adapt their course of instruction to the anticipated competition. In the army, two-thirds of the line commissions, and one-third of those for the scientific corps, are given to non-commissioned officers, but very few of these rise beyond the rank of captain; the remaining commissions in the line and scientific corps, and all appointments to the staff, are given by competition, after a careful course of professional education. The candidates in open competition are placed according to merit either in the Infantry School of St Cyr, or the celebrated Polytechnique; at both colleges, they have the right, if they need it, to partial or entire state support. From the School of St Cyr, the more promising pupils pass to the Staff School, and thence, after a thorough course, to the *Etat Major* of the army; the remaining students pass as subalterns into the line. The pupils of the Polytechnique, which is entered after the age of 17 years, have annually about 160 valuable prizes open to them. The first 80 to 40 candidates usually select civil employment under the state, such as the "*Ponts et Chaussées*;" those next in merit choose the Artillery and Engineers, and pass through a technical course at the School of Application. The remaining students either fail to qualify, and leave the school, or have to content themselves with commissions in the line, subordinate situations in the government, civil or colonial service, or they retire into civil life altogether.

In actual service, there are schools for the men, who are also taught trades and singing. The standard of education among French soldiers is far higher than among their English brethren, as the conscription draws the men from all classes of society.

The Prussian system of military education differs from that of France in that competition is but sparingly resorted to; and the object is to give a good general and professional education to all the officers, rather than a specially excellent training to a selected few. Aspirants for commissions must enter in the ranks, and within six months pass a good examination in general and liberal knowledge; if, however, the candidate has been educated in a cadet-house—which is a semi-military school for youths—and has passed properly out of it, this examination is dispensed with. After some further service, the aspirant goes for nine months to one of three "*Division Schools*," where he completes his professional education. If he pass the standard here required, he is eligible for the next vacancy, but cannot be commissioned, unless the officers of the corps are willing to accept him as a comrade. The Artillery and Engineer schools do for those services what the Division schools do for the line. The culmination of Prussian military education is the Staff School, open to competition for all the officers of the army, and presenting the highest prizes in the profession. In all the schools, the candidates study at the expense of the state, or receive great auxiliary grants.

The Austrian system is very elaborate, and commences at an early age—boys intended for military service beginning their professional, almost contemporaneously with their general education. There are schools for training for non-commissioned officers and for officers; and senior departments for imparting more extended instruction to both classes. Candidates for appointment as non-commissioned officers pass by competition through the lower houses, where they remain till 11 years old; the upper houses, which detain them till 15; and the school companies, whence, after actual apprenticeship to service, a few pupils pass to the academies for aspirants for commissions, and the others are draughted into the service as non-commissioned officers. For officers, boys are pledged to the service by their parents at the age of 11, when they are placed in cadet-schools; after which, the state takes charge of them. At about 16, the boys pass, according to qualification, to the line or scientific corps academies; and four years later, into those services themselves. The young officer's chance of entering the Staff School—and therefore the staff—depends upon his place at the final academic examination. The competition observed throughout the course of military education is said to impart great vigor to the tuition.

In the Italian army, the system so nearly approaches that of France, that a separate description is unnecessary. It need only be stated that the educational status of the Italian officers is considered high.

**MILITARY SECRETARY**, an officer on the personal staff of generals in high command. His duties are to conduct the correspondence of his chief, and to transact a great amount of confidential business, which would dangerously occupy the time of the general himself. The military secretary to the officer commanding-in-chief at the War Office receives £1500 per annum, and is usually a general officer. The military secretary to a commander-in-chief in the field is for the most part below that rank, and receives only the staff pay of £346, 15s.; while to a general commanding a division only, an *Assistant Military Secretary*, at £173, 7s. 6d. per annum, is allowed. This staff pay is of course additional to the officer's regimental or unattached pay.

**MILITARY TRAIN**, formerly a highly important corps of the army, of which the function was to transport the provisions, ammunition, and all other matériel, together with the wounded in time of battle. It was formed after the Crimean war, on the dissolution of the Land-Transport Corps (q. v.). It comprised six battalions, in all 1840 officers and men; and its annual cost for pay, &c., was about £71,000. The corps ranked after the Royal Engineers, and was classed as Mounted Infantry, the officers receiving infantry rates, and the men cavalry rates of pay. The commissions were purchasable, as in the line. The men were armed with carbine and sword, but rather for defensive than aggressive purposes. Attached to each battalion were 166 horses, with proportionate wagons and ambulances.

It is proper to observe that the Military Train constituted only the nucleus of a transport service for a large army, and that in time of war it would be expanded by the addition of thousands of horses or mules, and the incorporation of many hundred drivers, &c. The advantage of possessing even a few men ready trained, and capable of directing the movements of others, was amply demonstrated by the failures of the Crimea in 1854—1856; so that parliament voted ungrudgingly the expense of this corps, although in time of peace it was comparatively without employment. The Military Train was disbanded in 1870, as being too military in its formation. Its functions were transferred to the Transport section of the Army Service Corps, a purely non-combatant organisation.

**MILITELLO**, a city of Sicily, in the province of Catania, and 21 miles south-west of the town of that name. Pop. (1872) 9978. It stands on a mountain in a somewhat unhealthy situation. In its vicinity there are important salt lagoons.

**MILITIA** (Lat. *miles*, a soldier) has now the acquired meaning of the domestic force for the defence of a nation, as distinguished from the regular army, which can be employed at home or abroad in either aggressive or defensive operations. Every nation has a reserve, under its law military, upon which its defence would fall, on the discomfiture of the regular army; but the system differs in each country, and with the exception perhaps of the United States during peace, none are formed on the model of the British militia.

The militia is a constitutional force raised under the sanction of parliament, in which the people—in theory, at least—wage their own bodies for the defence of their own soil, and in which they depnte the sole leadership and command to the sovereign and the crown nominees. Organised by counties and cities, it is essentially a local force: the selection of candidates for first commissions by the lord-lieutenant of the county connects it with the land, while the command of the sovereign effectually combines in it the interests of the three estates. Under the Anglo-Saxons, all men were required to bear arms, as a sort of body-rent for the land they held; but no special organisation being adopted, efficiency was rarely attained in the use of arms. This the nation found to its cost when the Danes overran it during Alfred's reign. That great king, to prevent a similar occurrence, established the militia or *fryd*, making land the basis of numbers, but the family system that of discipline: so many families were a tithing, ten tithings a hundred, and hundreds were united into county powers, each under its *heretoch*, *dux*, or duke. Each section of the community had not only to furnish its quota in time of war, but also to provide arms, keep them in repair, and to undergo so many days' training every year. This arrangement subsisted in more or less vigor until the Conquest; then the feudal troops at first

rendered the militia unnecessary; but it never ceased wholly to exist. When the crown began to contend with the Norman barons, it naturally found its most powerful instrument in reviving the Saxon militia, and the English yeomanry became thenceforth the fear of England's enemies, and a guarantee for the gradual enfranchisement of the people. Henry II. established "an assize of arms," at which every holder of land was bound to produce one or more men fully equipped, and capable of fighting in the national defence. The arms were annually inspected, and it was illegal to sell, lend, or pawn them. This annual assembly of the fyrd or militia is first recorded after the Conquest in 1181; by the statute of Winchester in 1285, Edward I. revised the scale of arms for the several ranks. Further alterations to suit the advances in the art of war took place in 1558 (4 and 5 Ph. and M. c. 2). In 1604, James I. (1 Jac. c. 25) abolished the fyrd, and substituted "Trained (commonly called Train) Bands," to the number of 160,000 men—a force partaking of the nature of militia and volunteers, but deficient in discipline and drill. During the civil war of Charles I., the train bands or militia mostly sided readily with the parliament. Up to this time, the command had never by any law been definitely assigned to the crown or to any other body. After the Restoration, the loyal parliament of Charles II. immediately reorganised the militia—essentially on its present footing—and declared as law that "the sole supreme government, command, and disposition of the law is, and by the laws of England ever was, the undoubted right of his majesty and his royal predecessors." As, however, the crown from this time began to depend for its support upon a mercenary army, and as the local status of the militia officers must always render the militia a force dependent on parliamentary influence and ties, the militia was much neglected until 1757, when a large portion of the regular army being absent in the Seven Years' War, it was carefully organised for the defence of the kingdom. Several militia acts have been subsequently passed, but rather with a view to consolidating the militia laws of England, Scotland, and Ireland, and to effect minor changes necessary for the growth of the institution, than to remodel in any essential degree the constitution of the force. The acts under which the militia is now organised are the 42 Geo. III. c. 90 and 91; 49 Geo. III. c. 120; 15 and 16 Vict. c. 50; 17 and 18 Vict. c. 13, 105 and 106; 18 and 19 Vict. c. 57, 100, and 106; and 33 and 39 Vict. c. 69, consolidating previous acts. The present law stands thus: The sovereign appoints lords-lieutenant of counties, who nominate to first commissions in their county regiments. The general commanding in the military district commands the militia force through the colonels of the sub-districts in which the regiments respectively are.

The force to be provided by each county—known as its "quota"—is fixed by government in proportion to the population, &c. The numbers must be provided in some way. In practice, they are raised by voluntary recruitment; but should volunteering fail, a levy by ballot would be made upon all the inhabitants of the locality between the ages of 18 and 35. The power of making this ballot always exists, and would have by law to be enforced, but for the Militia Ballot Suspension Act, which, when the measure is unnecessary, is passed from year to year. Many classes are exempt from the ballot, as peers, soldiers, volunteers, yeomanry, resident members of universities, clergymen, parish schoolmasters, articulated clerks, apprentices, seafaring men, crown employes, free watermen of the Thames; in England, any poor man with more than one child born in wedlock; in Scotland, any man with more than two lawful children, and not possessed of property to the value of £50; in Ireland, any poor man not worth £10, or who does not pay £5 per annum for rent, and has more than three lawful children under the age of 14.

The militia are bound, when called upon by the crown, to assemble annually for any period not exceeding three months, for training purposes; and the government can embody the whole, or part of the force, at any national crisis. The regiments were embodied, almost without exception, during the Russian war of 1854–1856, and to a considerable extent at the time of the Indian mutiny, 1857–1859. The quota of the United Kingdom is 200,000 men, but not above two-thirds of that number can be considered as effective. They may not be sent out of the kingdom, except they volunteer, and then only by special permission of parliament. As a defensive or garrison force, setting free the regular army for aggressive operations, the militia is a most valuable institution; and in times of war, it has ever been found an admirable training-school whence soldiers volunteer into the permanent forces.

A militia volunteer receives bounty, payable partly on joining, and partly in instalments after each training period. When out for training, or embodied for permanent duty, the officers and men receive the same pay as regular troops of corresponding arms of the service, and are under the Mutiny Act and Articles of War, except that no punishment can extend to life or limb. The officers rank with, but junior to, their brethren of the regular army; the great distinction in appearance between regular and militia troops being, that in the former the appointments are all of gold-lace, and in the latter, of silver; the buttons being similarly distinguished. The force is divided into Heavy, Light, Rifles, and Highland Infantry, and into Artillery, the latter being generally limited to coast counties, and being very highly esteemed by the authorities.

The celebrated Local Militia was instituted in England and Scotland in 1808, and suspended in 1816. It consisted of a force for each county six times as numerous as the proper militia quota, comprising, of course, many classes, which, from age or other circumstances, were ineligible for the militia. These troops could only be marched beyond their respective counties in the event of actual invasion. Their numbers reached, in 1811, to 213,000 men.

The cost of the militia for the year 1876-1877 amounted to £1,168,708 for effective services, and £37,401 for non-effective services. As a constitutional precaution, the estimates were formerly prepared—at least nominally—by a committee of the House of Commons; but as the check was of no real advantage, it was abolished by a resolution of the House in 1863, and thenceforward the Minister of War includes the charge among the many services provided for in his department.

MILK is an opaque white fluid secreted by the mammary glands of the females of the class *Mammalia*, after they have brought forth their young, and during the period in which their offspring are too immature to live upon ordinary food. It is devoid of odor, except for a short time after its extraction; is of a slightly sweet taste, most commonly of a slightly alkaline reaction (except in the *Carnivora*, in which it is acid); and its average specific gravity (in the case of human milk) is 1032.

When milk has been allowed to stand for some time, a thick, fatty, yellowish-white stratum (the cream) forms upon its surface. When this is removed, the fluid below (popularly known as "skim-milk") is found to be of greater specific gravity, and of a more bluish-white tint. Milk does not coagulate on boiling, but a membrane or film of coagulated caseine, containing fat corpuscles, forms upon its surface. If milk be allowed to stand for some days exposed to air at the ordinary temperature, it gradually begins to exhibit an increasing acid reaction, from the formation of lactic acid from the milk-sugar; while the caseine becoming coagulated by the action of the lactic acid, is separated in the form of "curds," and the fluid gradually assumes the form of a thickish pulp. The ordinary means of obtaining the caseine (which exists in solution in the milk) in the form of curds is by the addition of a piece of rennet (the dried stomach of the calf), which acts as powerfully as any acid. The curds thus separated form the basis of cheese, while the fluid portion left after their removal is known as the "whey."

The following table, which is based on the researches of Vernols and Becquerel, represents the density and composition of 1000 parts of milk in various animals:

	Density.	Water.	Solid Constituents.	Caseine & Extractive Matters.	Sugar.	Fat (Butter)	Salts.
Woman.	1032.67	899.08	110.92	39.24	43.64	26.66	1.38
Cow ....	1033.38	864.06	135.94	55.19	38.03	26.12	6.64
Mare....	1033.74	904.80	95.70	33.35	32.76	24.86	5.23
Ass.....	1034.57	890.12	109.88	35.65	50.46	18.53	5.24
Goat....	1033.53	814.90	155.10	35.14	36.91	56.87	6.18
Ewe.....	1040.98	832.32	167.63	69.78	39.43	51.31	7.16
Bitch....	1041.63	772.03	227.93	116.88	15.29	87.95	7.80

When examined under the microscope, the milk appears as a clear fluid, containing fat globules (the milk globules, as they are usually called) in suspension.



They commonly vary from .0012 to .0018 of a line in diameter. They are each invested with a delicate coat of caseine, which prevents their running together. By *churning*, the surrounding envelopes become ruptured, and the contents are made to unite, forming *butter*. In addition to milk globules, colostrum globules (see COL-OSTRUM), which are irregular conglomerations of very small fat globules, occur in the milk for three or four days after delivery.

The actual caseine which in the preceding analyses is associated with the undefined group of substances termed *extractive matters*, ranges from 27 to 35 in 1000 parts of healthy human milk, while in the colostrum it amounts to 40; in the milk of the cow it is somewhat higher; while in that of the bitch, and probably of all carnivorous animals, it is more than trebled. It is found in the case of women that the quantity of the caseine increases with the free use of animal food, and diminishes upon vegetable diet.

The fatty matters range from 25 to 43 in 1000 parts of women's milk, while in cows' milk they average, according to Lehmann, 45; and in bitches' milk, rise to 110. These fatty matters, which collectively form butter, consist of an admixture of 68 per cent. of margarine, 30 per cent. of oleine, and 2 per cent. of an admixture of fats, which, on saponification, yield butyric, caproic, caprylic, and capric acids. The milk which is last yielded is much richer in fat than that which is first drawn.

The sugar, or lactine, whose properties are described in the article SUGAR OF MILK, varies in human milk from 32 to 62 in 1000 parts, and in cows' milk from 34 to 43. The milk of bitches, when fed on a purely animal diet, often contains no traces of sugar; but if they are fed on vegetable or mixed food, a considerable quantity of sugar is found. The salts in women's milk range from 0.6 to 2.5 in 1000 parts, and in cows' milk from 3.5 to 8.5. That a peculiar selective power is exerted by the mammary gland, is shewn by the following table, which shews the comparative analysis of the ashes of cows' milk and of cows' blood, each reckoned for 100 parts:

	Ash of Milk.	Ash of Blood.
Chloride of potassium.....	14.18	none
Chloride of sodium.....	4.74	38.82
Potash.....	23.46	11.44
Soda.....	6.96	29.09
Phosphoric acid.....	28.40	7.74
Lime.....	17.34	1.90
Magnesia.....	2.20	0.75

Why the potassium and sodium compounds stand in this inverse relation to one another in these two fluids, is not accurately known. The abundant supply of phosphoric acid, lime, and magnesia in the milk, is doubtless for the purpose of building up the infant skeleton.

The milk is liable to tolerably regular changes at different periods of lactation; for example, the sugar is deficient during the first month, and is in excess from the eighth to the tenth month; the caseine is in excess during the first two months, and is most deficient between the tenth and eleventh month; the butter is considerably in excess during the first month, and slightly so for the next two months; while the salts are most abundant during the first month, but present no regular law of decrease. Hence, it will readily be seen that in the selection of a wet-nurse, one of the leading requirements should be, that her milk should be of the same age as that of the mother's. Various medicines, as, for example, iodide of potassium, iodide of mercury, and quinine, have been detected in the milk, after being taken by the mother; and many cases are on record in which strong mental impressions, as fear or anger, acting on the mother, have so far poisoned the milk as to cause immediate convulsions in the infant.

The daily quantity of milk is dependent upon various conditions, such as bodily constitution, food, &c. Lamporriere determined the quantity of milk secreted in definite times by a large number of women, and found as a mean for each breast between fifty and sixty grammes (the gramme being 15.4 grains) in the course of two hours, assuming that the secretion continues at a uniform rate.

In those cases in which a wet-nurse cannot be obtained, it is expedient to modify cows' milk, so as to make it resemble that of women. The main differences are, that the former contains more caseine, and less sugar and water than the latter. By

exposing cows' milk to a gentle heat in a wide open vessel, we obtain a film of caseine which may be removed (more than once, if necessary); on then adding sugar (sugar of milk, if procurable) and water, we obtain a good imitation of the human secretion.

In the article on *Digestion*, the uses of the leading ingredients of the milk in relation to nutrition are sufficiently noticed. The milk of cows is extensively used as an article of diet both for healthy persons and invalids, and it enters largely into all hospital, prison, and workhouse dietaries. In patients with a tendency to consumption, or in whom that disease has already manifested itself in its early form, cream is often of great service, especially when the stomach cannot bear cod-liver oil.

The adulterations to which milk is often subjected are noticed in the article *Food*, and the instruments used for testing the purity of this fluid are briefly referred to in the article *GALACTOMETER*. Water is by far the commonest adulteration, and if it has been added in large quantity, the fraud may be detected by evaporating a small weighed quantity of the milk (say 500 grains) to dryness, and ascertaining whether the due proportion of solid constituents is left.

Various methods have been proposed for the preservation of milk for sea-voyages, &c. Moore's Essence of Milk is prepared by the addition of a little sugar and the evaporation of the fluid, at a temperature of 110° to one-fourth of its bulk, when it is put in small tin-cases, soldered down, steeped in boiling water for a time, and taken out to cool. This preparation keeps good for a long time. Blatchford's Solidified Milk is prepared by mixing 112 lbs. of milk with 28 lbs. of white sugar and a little bicarbonate of soda. The mixture is evaporated under certain conditions, till it assumes the form of a creamy powder, which is cooled, weighed into parcels of 1 lb. each, and compressed into brick-shaped masses, which must be triturated and mixed with warm water when required for use. Grimwade's De-siccated Milk is prepared by mixing the fluid with a little sugar and alkali, and evaporating it till it is as thick as dough; it is then dried, crushed and bottled. At the meeting of the British Association in 1859 Abbé Moigno described four methods employed in France for the preservation of milk, of which the most valuable seemed those of Maber and De Pierre. For details regarding these methods, we must refer to the abbé's paper. He found milk prepared by Maber's process perfectly good after having been kept between five and six years. The milk prepared by De Pierre's process, unlike the other preparation, is liquid. A specimen of it, the age of which was not stated, which the abbé brought to Aberdeen, was found to be perfectly fresh. The preparation of condensed milk is now conducted on a large scale in Switzerland.

**MILK-FEVER**, in the lower animals, comes on within a few days after parturition. One variety, common to most animals, consists in inflammation of the membranes of the womb and bowels, and is produced by exposure to cold, overdriving, or injury during labor; it is best treated by oil and laudanum, tincture of acouite, and hot fomentations to the belly. The other variety, almost peculiar to the cow, attacks animals in high condition, that are good milkers, and have already borne several calves; it consists in congestion and inflammation of the brain and large nervous centres, and impairs all the vital functions, leading to dulness, loss of sensation and motion, and stupor. Blood must be drawn early, whilst the cow is still standing and sensible. Later, it only hastens death. A large dose of physic, such as a pound each of salts and treacle, a drachm of calomel, an ounce of gamboge, and two ounces of ginger, should at once be given, solid food withheld, clisters of soap, salt, and water thrown up every hour, cloths wrung out of boiling water applied along the spine, the teats drawn several times daily, and the animal frequently turned. Although treatment is uncertain, prevention is easily insured by milking the cow regularly for ten days before calving, feeding sparingly on laxative unstimulating food, giving several doses of physic before, and one immediately after calving; and when the animal is in very high condition, and prone to milk-fever, bleeding her a day or two before calving.

**MILK VETCH.** See *ASTRAGALUS*.

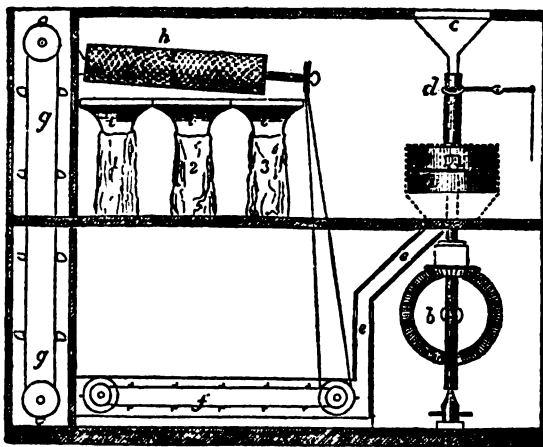
**MILKY-WAY.** See *GALAXY*.

**MILKWORT.** See *POLYGALA*.

**MILL.** This word is now used in a general way as a name for almost all kinds of manufactories, as well as for grinding machinery; but we shall only describe here the arrangements of an ordinary flour-mill, adding a brief notice of the edg-mill in use for grinding oil-seeds and some other substances.

From time immemorial, corn has been ground by a pair of stones. The earliest and rudest handmills were no doubt somewhat like one sent home by Dr Livingstone, the African traveller, from the banks of the Shire, in South Africa. He describes it as "a mill such as Sarah used, when told by her lord to do the thing handsomely and in a hurry for the strangers—i. e., a big stone worn hollow by the operations of grinding. The upper stone is grasped by both hands, and the weight of the body brought down on it as it is shoved to the lower part. . . . The meal is made very fine." The next step in advance of this was the quern or handmill, still in use in the Shetland Isles, the Farðes, and other places. The old quern scarcely differs from a pair of modern millstones, except in the stones being small enough to allow of the upper one being turned by the hand, instead of by wind, water or steam power.

The millstones which are now all but universally used for grinding corn are made from buhr-stone, a form of silica like flint in hardness, but not so brittle. This rock is only found in abundance in the mineral basin of Paris and some adjoining districts, and belongs to the Tertiary formation. It is of a cellular texture, and is frequently full of silicified shells and other fossils. Millstones are usually from four to six feet in diameter, and are each made up of a number of pieces strongly cemented and bound together with iron hoops. One six feet in diameter, of fine quality, will cost about £50. The grinding surface of each stone is furrowed or grooved, the grooves being cut perpendicularly on the one side, and with a slope on the other. A pair of stones are used together, and both being furrowed exactly alike, the sharp edges of the grooves on the one come against those on the other, and so cut the grain to pieces.



The figure shows a section of a flour-mill reduced to its simplest elements. The millstones are at *a*, the lower of which is firmly fixed, it being a matter of importance to have this done securely; and the upper is made to revolve, on a shaft which passes up through the lower one, at a speed of one hundred revolutions per minute

more or less. Motion is communicated by the spur-wheel *b*, which is driven by a water-wheel or other power. The corn, previously cleaned, is supplied to the millstones by means of the hopper *c*, connected with which there is a valve, *d*, for regulating the supply. Passing through a hole in the centre of the upper millstone, it comes in between the two, where it is ground, and thrown out on all sides by means of the centrifugal force. The millstones are, of course, enclosed, and the flour passes down through the spout *e*, to the worm at *f*, which, while it cools the ground corn, carries it along to elevators *g*. These raise it up to the floor, on which the silk-dressing machine, *h*, is placed. This is a cylinder, which was formerly made of wirecloth of various degrees of fineness, and consequently separated the flour into different qualities—the finest passing through the first portion, the second passing through the next, and so on; but no part of it large enough in the openings to let through the bran, which passed out at the end. Silk is now preferred to wirecloth for dressing the flour. Hoppers, *i*, are placed below the dressing-machine, by means of which the flour and bran are filled into sacks; No. 1. being fine flour; No. 2. seconds; and No. 3. bran.

One of the largest flour-mills in Great Britain is the one belonging to Messrs Tod at Leith. It is about 150 feet long, 60 feet broad, and 65 feet high. At one end of it is placed a steam-engine of 850 horse-power, which works all the machinery of the mill. This communicates motion to a series of shafts and wheels occupying the ground-floor, belts being used as much as possible for driving the wheels instead of spur-gear, so as to avoid a shaking motion. On the second floor are placed 36 pairs of millstones, arranged in two lines along the room, the wheat being supplied silently to them by centrifugal feeders. On the third floor are situated the hoppers for feeding the millstones. The fourth floor contains iron rollers for partially crushing the wheat before being supplied to the millstones. This floor also contains silk and wire dressing-machines. On the fifth floor are placed the first silk dressing-machine, and also smut-machines for cleaning the wheat previous to grinding, which are somewhat similar to thrashing-machines. The sixth and highest floor also contains smut-machines. All these machines are connected in the most skillful manner by means of elevators ascending through all the floors; and along each, where necessary, there runs, in a horizontal direction, an Archimedean screw, so that the grain or the flour can be conveyed to any of the machines without the assistance of hand-labor.

This mill converts wheat into flour at the rate of about 500 sacks a day of 24 hours—a quantity nearly sufficient to supply bread for the entire population of a city like Edinburgh. [The above description applies to Messrs Tod's mill as it stood in 1863. It was subsequently greatly extended; and, after being destroyed by fire in 1874, has been completely refitted.] The great government mill of St Maur is the most remarkable mill in France.

There is a form of mill in use for some purposes where the millstones are vertical, and called the edge-stone mill. It is sometimes, though rarely, used for grinding corn; but is much employed for crushing oil-seeds and for grinding dyestuffs, sugar, chemicals, and a multitude of other substances. The stones are generally of some hard rock, such as granite or sandstone, and from 5 to 7 feet in diameter. For such purposes as grinding clay or loam, they are usually made of cast iron, and of a smaller size. The stones revolve in opposite directions, sometimes upon a fixed stone or metal bed, and at other times it is the bed-plate itself which revolves, and in so doing turns the edge stones which rest upon it.

Among the recent improvements in our flour-mills which have attracted considerable attention are: 1. The patent process of dressing the grinding surface of the millstones by means of a peculiar kind of diamond, which rapidly covers it with fine grooves. This is still, however, more largely, and perhaps more efficiently, done by the slower process with the nidding hammer; 2. The keeping down of the temperature of the millstones by means of a current of cold air; and, 3. The introduction of Carr's Patent Disintegrator, which grinds wheat and other substances by means of two vertical iron discs about five feet in diameter, and a few inches apart, in each of which are several concentric rows of steel pegs, so arranged that those on the one disc overlap without touching those on the other. The discs are made to revolve rapidly in opposite directions, so as to grind the wheat by percussion.

**MILL**, in Law. The owner of a mill situated on the bank of a stream is entitled to have the use of the stream undiminished in volume; and if the other riparian owners above interfere with the stream by diminishing its volume, thereby causing injury to the mill, the mill-owner has a right of action against the party so acting.

**MILL**, James, was the son of a small farmer, and was born in the neighborhood of Montrose, Scotland, 6th April 1778. He studied, with a view to the church, at the university of Edinburgh, where he distinguished himself in Greek and in Moral and Metaphysical Philosophy. He was licensed to preach in 1799; but instead of following out the ministry, he went to London in 1800, where he settled as a literary man. He became editor of the "Literary Journal," which after a time was discontinued; and wrote for various periodicals, including the "Eclectic" and the "Edinburgh Review." In 1806, he commenced his "History of British India," which he carried on along with other literary work, and published in the winter of 1817-1818. The impression produced by this masterly history on the Indian authorities was such, that, in 1819, the Court of Directors of the Company appointed him to the high post of Assistant-examiner of Indian Correspondence, notwithstanding the then unpopularity of his well-known radical opinions. The business assigned to his care was the Revenue department, which he continued to superintend till four years before his death, when he was appointed head of the Examiner's office, where he had the control of all the departments of Indian administration—political, judicial, and financial—managed by the Secret Committee of the Court of Directors. Shortly after his appointment to the India House, he contributed the articles on Government, Education, Jurisprudence, Law of Nations, Liberty of the Press, Colonies, and Prison Discipline to the "Encyclopædia Britannica." These essays were reprinted in a separate form, and became widely known. The powers of analysis, of clear statement, and of the thorough-going application of principles, exhibited in these articles, had probably never before been brought to bear on that class of subjects. In 1821-1822, he published his "Elements of Political Economy," a work prepared primarily with a view to the education of his eldest son, John Stuart Mill. In 1829, his "Analysis of the Human Mind" appeared. His last published book was the "Fragment on Mackintosh," brought out in 1835. He was also a contributor to the "Westminster Review" and to the "London Review," which merged in the "London and Westminster."

Not long after he settled in London, he made the acquaintance of Jeremy Bentham, and for a number of years lived during the summer in Bentham's country-house. Although he must have derived much benefit from his intercourse with the great law-reformer, he was not a mere disciple of Bentham, but a man of profound and original thought, as well as of great reading, in all the departments of moral, mental, and political philosophy. His conversation was impressive to a remarkable degree, and he gave a powerful intellectual stimulus to a number of young men, some of whom (including his own son, and Mr Grote, the historian of Greece) have since risen to eminence. He took a leading part in the founding of University College, London. He died at Kensington, 23d June 1836. See Autobiography of J. S. Mill, and an interesting Biography by Professor Bain in "Mind," 1876-78.

**MILL**, John Stuart, son of the preceding, was born in London on the 20th of May 1806. He was educated at home by his father. In 1820, he went to France, where he lived for upwards of a year, making himself master of the French language, and occasionally attending public lectures on science. He lived for some time at Paris, in the house of the French economist, Jean Baptiste Say, where he made the acquaintance of many men distinguished then, or afterwards, in letters and in politics. He spent part of his time in the south of France, in the house of Sir Samuel Bentham, brother to Jeremy Bentham. During this stay in France, he laid the foundation of his great familiarity with, and interest in, the politics as well as the literature of the French nation. In 1823, he entered the India House, and became a clerk in the Examiner's office, where his father was Assistant-examiner. For thirty-three years he continued to be occupied in the department of the office named the Political, or the transactions of the Company with the native states. In 1831, he was appointed Assistant-examiner, and in 1836 he was placed at the head of the department. He energetically opposed the transfer of the India government

to the crown in 1868. On the score of failing health he declined a seat at the new Indian Council, and retired from office in October of the same year, on a compensating allowance. At the general election of 1865, M. was returned to parliament for Westminster; and till he lost his seat at the election of 1868, he acted with the Advanced Liberals. He died, May 8 1873, at Avignon, where he had spent most part of the last years of his life.

Mr Mill became an author at a very early age, and may be looked upon as one of the foremost thinkers of his time. His first publications consisted of articles in the "Westminster Review." He took an active part in the political discussions that followed the revolution of 1830 in France, and the Reform-Bill movement in England; and from 1835 to 1840 was editor, and along with Sir W. Molesworth, proprietor of the "London and Westminster Review," where many articles of his own appeared. In 1843, he published his "System of Logic;" in 1844, "Essays on some Unsettled Questions of Political Economy;" in 1848, the "Principles of Political Economy;" in 1859, an essay on "Liberty;" in 1860, "Discussions and Dissertations;" in 1863, a small work on "Utilitarianism;" in 1865, "Comte and Positivism," and the "Examination of Sir William Hamilton's Philosophy;" in 1867 (when M. was rector of St Andrews University), his "Inaugural Address;" in 1868, "England and Ireland;" and in 1869, "The Subjection of Women." After his death appeared his "Autobiography" (1873), read with intense interest; "Three Essays on Religion" (1874); and a second volume of "Discussions and Dissertations" (1875).

MILLAIS, John Everett, R.A., a celebrated English painter, was born at Southampton in 1829, entered the Royal Academy at the age of eleven, and in 1847 carried off the gold medal for his picture of "The Tribes of Benjamin seizing the Daughters of Shiloh," exhibited, in the following year, at the British Institution. Before this period, he had acquired a considerable reputation among younger painters by his avowed antipathy to the principles of art which then prevailed. His views were shared in by other students, such as Holman Hunt (q. v.), Dante Rossetti (q. v.), and Charles Collins, and a sort of artistic fraternity was formed, which obtained the name of the *Pre-Raphaelite School*. M.'s principal paintings are: "Our Saviour" (1850), "Mariana in the Moated Grange" (1851), "The Huguenot" and "Ophelia" (1853), "The Order of Release" and "The Proscribed Royalist" (1853), "The Rescue" (1855), "Autumn Leaves" (1856), "The Heretic" (1858), "Spring Flowers" (1860), "The Black Brunswicker" (1861), "My First Sermon" (1863), "My Second Sermon" (1864), "Joan of Arc" (1865), "Sleeping," "Waking," "Jephtha" (1867), "Moses" (1871), "Chil! October" (1871), "Day Dreams" (1874), "Sound of Many Waters" (1877), &c. Whatever opinions may be held of M. as an *artist*, no respectable critic denies the subtlety of his imagination and depth of sentiment. He is profoundly poetical, and has probably never been surpassed in representing intense feeling and thought by means of color and composition; but his perverse affectation, and contempt for "conventionalism," have marred his finest productions.

MILLEDGEVILLE, the former capital of Georgia, United States of America, on the west bank of the Oconee River, 150 miles north-west of Savannah, in a rich cotton country. Among its edifices are the former governor's residence and state buildings, and several churches. Pop. (1870) 2750; (1880) 3,800.

MILLENNIUM (Lat. a thousand years' time) designates a certain period in the history of the world, lasting for a long indefinite space (vaguely a thousand years), during which the kingdom of Messiah will, according to tradition, be visibly established on the earth. The idea originated proximately in the Messianic expectations of the Jews; but more remotely, it has been conjectured, in the Zoroastrian doctrine of the final triumph of Ormuzd over Ahriman, and was connected by the Christians with the *Parousia*, or Second Coming of Christ. The notion of a Golden Age, preserved by the converts from heathenism to Christianity, as well as the oppression and persecutions to which they were long subjected by the state authorities, were naturally calculated to develop and strengthen such hopes. The chief basis of the millenarian idea in Judaism as well as in Christianity, however, is the ardent hope for a visible divine rule upon earth, and the identification of the church with that of which it is merely a symbol. In the 1st c. of the church, millenarianism (the Greek equivalent of which, *chiliasm*, from *chilioi*, a thousand, is the term em-

played by the Fathers) was a widespread belief, to which the book of Daniel, and more particularly the pictorial predictions of the Apocalypse (chaps. xx. and xxi.), gave an apostolical authority; while certain prophetic writings, composed at the end of the 1st and the beginning of the 2d c.—such as the “Testament of the Twelve Patriarchs,” the “Fourth Book of Edras,” the “Revelation of Saint Peter,” &c.; also the “Christian Sibylline Books,” the “Epistle of Barnabas,” the “Shepherd of the Pseudo-Hermas,” several Midrashim, Targums, and other works of a partly legendary character embodied in the “Talmud”—lent it a more vivid coloring and imagery. The unanimity which the early Christian teachers exhibit in regard to millenarianism, proves how strongly it had laid hold of the imagination of the church, to which, in this early stage, Immortality and future Rewards were to a great extent things of this world as yet. Not only the heretic Cerinthus, but even the orthodox doctors—such as Papias, Bishop of Hierapolis, Irenæus, Justin Martyr, &c.—delighted themselves with dreams of the glory and magnificence of the millennial kingdom. The “Sibylline Books,” for instance, hold that the earth will be cultivated throughout its length and breadth, that there will be no more seas, no more winters, no more nights; everlasting wells will run honey, milk, and wine, &c. &c. Papias, in his collection of traditional sayings of Christ (“Kuriakôn Logiôn Exegésis”), indulges in the most monstrous representations of the rebuilding of Jerusalem, and the colossal vines and grapes of the millennial reign. Every vine will bear 10,000 branches, every branch 10,000 shoots, every shoot 10,000 sprigs, every sprig 10,000 bunches, every bunch 10,000 berries, every berry 84 times 25 gallons of wine; and if a Saint come to pluck a berry, they will all cry out: “Pluck me, O Saviour, I am better, and praise the Lord through me.” The Talmud calculates the height of the men of the millennium to be, as before the Fall, of 200—900 yards; the moon shall be, according to a prophetic dictum, like the sun; the sun shall be increased 843 times; and every Israelite will beget as many children as there were Israelites going out from Egypt—60,000. Each grape will be large enough to fill the biggest ship. Above all, however, the land of Israel will be free again, and the primitive worship restored with unheard-of splendor. “Such a chillsam,” Neander justly remarks, could only “promote a fleshly endaimonism;” and indeed ere long it called into more energetic activity the opposition of Gnostic spiritualism. According to the general opinion, which was as much Christian as Jewish, the millennium was to be preceded by great calamities, reminding us in some degree of the Scandinavian Ragnarök (or “Twilight of the Gods”). The personification of evil appeared in *Antichrist*, the precursor of Christ (identified during the 1st c., with Nero), who would provoke a frightful war in the land of Magog (Ezek. chaps. xxxviii. and xxxix.) against the people Gog, after which the Messiah—some say a double Messiah, one the son of Joseph, vanquished in the strife; the other, the victorious son of David—would appear, heralded by Elias, or Moses, or Melchizedek, or Isaiah, or Jeremiah, and would bind Satan for a thousand years, annihilate the godless heathen, or make them slaves of the believers, overturn the Roman empire, from the ruins of which a new order of things would spring forth, in which the “dead in Christ” would arise, and along with the surviving saints enjoy an incomparable felicity in the city of the “New Jerusalem,” which was expected to descend literally from heaven. To the innocence which was the state of man in Paradise, there was associated, in the prevalent notions of the millennium, the finest physical and intellectual pleasures.

In the Mosaic account of creation, we find the primitive ground for making the victorious era of the church last a thousand years. That account was regarded by the Jews and by the Judaic Christians as a type of the destinies of creation. Now, by a strictly literal interpretation of the 4th verse of the 90th Psalm, it was supposed that a day of God was arithmetically equal to a thousand years; hence the six days of creation were understood to indicate that the earth would pass through 6000 years of labor and suffering, to be followed by a seventh day—that is, 1000 years of rest and happiness. In the Book of Revelation (chap. xx.) this view is presented. Still, the rabbinical traditions differ widely among themselves as to the duration of the happy period. Instead of 1000 years, some of them count 40, 70, 90, 365, 400, 600, 2000, or 7000, or so many years as have elapsed from the creation of the world or the flood. The gospel of Nicodemus makes it 500 years, &c. In

fact, the systems of apocalyptic chronology were of a varied and somewhat arbitrary cast; according as their originators laid greater stress upon the Apocalypse, the Book of Daniel, the Song of Songs, the Jewish "Gematria," or Computation of Letters—a very pliable art in itself—or on astronomy, astrology, "natural phenomena," and the like.

The lapse of time chilling the ardor of the primitive Christian belief in the nearness of the *Parousia*, had without doubt also the tendency to give a more shadowy, and therefore a more spiritual aspect to the kingdom over which the expected Messiah was to reign. The influence of the Alexandrian philosophy contributed to produce the same result. Origen, for example, first started the idea, that instead of a perpetual opposition of Paganism to Christianity—instead of a final and desperate conflict between the two—instead of an insolent triumph on the part of the saints, and a servile submission on the part of the unbelievers, the real progress and victory of Christianity would consist in the gradual spread of the truth throughout the world, and in the voluntary homage paid to it by all secular powers. This was an immense advance on the views previously entertained. It is owing largely to Origen and his disciple Dionysius that more spiritual conceptions of the millennium finally established themselves in the church; at all events, they furnished the Fathers with the majority of their arguments. Yet even in the Egypto-Alexandrian Church, millenarianism, in its most literal form, was widely diffused, and was only eradicated by the great wisdom and moderation of Dionysius. The Montanists (q. v.) generally, as might be expected from the enthusiastic tendencies of the sect, were extreme millenarians or chiliasts, and being considered a heretical sect, contributed largely to bring Chiliasm into discredit, or, at all events, their own carnal form of Chiliasm, which Tertullian himself attacked. Cælius, the Presbyter, in his "Disputation" against the Montanist Proclus, traces its origin to the hated heretic Cerinthus, whom he accuses of forging a certain revelation, which he passed off as the work of an apostle. From his description of this revelation, it is almost certain—strange as it may appear—that he alludes to the canonical Apocalypse, Lactantius, in the beginning of the 4th c., was the last important church Father who indulged in chiliastic dreams, while among its earlier advocates may be mentioned chiefly Nepes, Methodius, Korakion, Apollinaris, Victorinus, &c. In the 6th c., St Jerome and St Augustine expressly combated certain fanatics who still hoped for the advent of a millennial kingdom whose pleasures included those of the flesh. But from this time, the church formally rejected millenarianism in its sensuous "visible" form, although the doctrine every now and then made its reappearance, especially as a general popular belief, in the most sudden and obstinate manner. Thus the expectation of the *Last Day* in the year 1000 A.D. re-invested the doctrine with a transitory importance; but it lost all credit again when the hopes, so keenly excited by the Crusades, faded away before the stern reality of Saracenic success, and the predictions of the "Everlasting Gospel," a work of Joachim de Floris, a Franciscan abbot (died 1212), remained unfulfilled.

At the period of the Reformation, millenarianism once more experienced a partial revival, because it was not a difficult matter to apply some of its symbolism to the papacy. The Pope, for example, was *Antichrist*—a belief still adhered to by some extreme Protestants. Yet the doctrine was not adopted by the great body of the Reformers, but by some fanatical sects, such as the Anabaptists and by the Theosophists of the 17th century. During the civil and religious wars in France and England, when great excitement prevailed, it was also prominent. The *Fifth Monarchy Men* of Cromwell's time were millenarians of the most exaggerated and dangerous sort. Their peculiar tenet was, that the millennium *had* come, and that they were the saints who were to inherit the earth. The excesses of the French Roman Catholic Mystics and Quietists terminated in chiliastic views. Among the Protestants, it was during the *Thirty Years' War* that the most enthusiastic and learned chiliasts flourished. These may—broadly—be brought under the three chief heads of *Exegetical* Chiliasts, who, by some biblical dates, endeavored to compute the predicted time; *Alchemistic* or *Kabbalistic* Chiliasts, who endeavored to hasten the period by some mystical discovery; and *Politico-theocratic* Chiliasts, who wished to reduce the governments of the world to a biblical standard. See ANABAPTISTS, MÜNZER. The awful suffering and widespread desolation of that time, led pious hearts to solace themselves with the hope of a peaceful and



Millepedæ  
Millet

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glorious future. Since men the penchant which has sprung up for expounding the prophetic books of the Bible, and particularly the Apocalypse, with a view to present events, has given the doctrine a faint semi-theological life, very different, however, from the earnest, practical faith of the first Christians. Among the foremost chiliastic teachers of modern centuries are to be mentioned Ezechiel Meth, Paul Felgenhauer, Bishop Comenius ("Lux in Tenebris," 1657); Professor Jurien ("L'accomplissement des Prophéties," 1686); Serarius ("Assertio du Regne de Mille Ans," &c., ab. 1670); Polret ("Economie Divine," 1687); J. Mede ("Clav. Apocal." 1627); while Thomas Burnet and W. Whiston endeavored to give chiliasm a geological foundation, but without finding much favor. Spener, on account of his "Hoffnung besserer Zeiten," has been accused of chiliasm; no less Joachim Lange ("Licht und Recht"); and Swedenborg employed apocalyptic images to set forth the transfigured world of the senses. Latterly, especially since the rise and extension of missionary enterprise, the opinion has obtained a wide currency, that after the conversion of the whole world to Christianity, a blissful and glorious era will ensue; but not much stress—except by extreme literalists—is now laid on the nature or duration of this far-off felicity. In fact, the common Christian conception of a millennium without a visibly present Christ, as held at the present day, is little different, so far as results are concerned, from the belief of philosophers in the perfectibility of the race. The essence of both conceptions is the cessation of sin and sorrow, the prevalence of holiness and happiness. But this departs widely from the "ancient hope of the church"—a kingdom of visible majesty, with Jesus and the saints ruling the world from Jerusalem, the central city of the earth!

Great eagerness and not a little ingenuity have been exhibited by many persons in fixing a date for the commencement of the millennium. The celebrated theologian, Johann Albrecht Bengel (*Erklärte Offenbarung; Reden für's Volk*), who, in the 18th c., revived an earnest interest in the subject among orthodox Protestants, asserted from a study of the prophecies that the millennium would begin in 1836. This date was long popular. Bengel's general millenarianism was adopted by Oettinger (d. 1783), and widely spread throughout Germany in a more or less poetic form by Hahn, Crusius, Jung Stilling, Lavater, and Hess (*Briefe über die Offend. Joh.*). Some of the greatest of the more recent German theologians are millenarians, such as Rothe, Delitzsch, Hoffmann, Kurtz, Hebart, Thiersch, Nitzsch, P. Lange, and Ebrard. Swedenborg, to whom reference has already been made, held that the last judgment took place in 1757, and that the New Church, or "Church of the New Jerusalem," as his followers designate themselves—in other words, the millennial era, then began. In America, considerable agitation was excited by the preaching of one William Miller, who fixed the second advent of Christ about 1843. Of late years, the most noted English millenarian is Dr John Cumming, who originally placed the end of the *present dispensation* in 1866 or 1867; but as that time drew near without any millennial symptoms, he was understood to have modified his original views considerably, and now conjectures that the beginning of the millennium will not differ so much after all from the years immediately preceding it, as people commonly suppose. See Corrodi's "Kritische Geschichte des Chiliasmus" (Zurich, 1794, 4 vols.); Calixtus, "De Chiliasmo cum antiquo tum pridem renato Helms." (1693, 4to); Klee, "Tentam Hist. crit. de Chil. prim. sœc. Heribip." (1825); Münter, "Dogmengeschichte," &c. A really good history of Chiliasm, however, is as yet a desideratum.

**MILLEPEDE**, a popular name of many kinds of *Myriapoda*, of the order *Chilognatha*, and chiefly of the families *Julidæ* (see *JULUS*) and *Polydesmidæ*. In the latter family, the feet are arranged in numerous groups along both sides; otherwise, they much resemble the *Julidæ*. The largest species are found in warm climates, and some of them are brightly colored; but small species of both families are common in Britain; and some of them, as *Polydesmus complanatus*—which is lilac-colored, flattened, and from a quarter to half an inch in length—are very destructive to the roots of plants. Doubt has been expressed if they attack roots perfectly healthy; but, at all events, they take advantage of incipient decay, and greatly extend and accelerate it. The application of salt, lime, nitrate of soda, &c., has been often recommended as a preventive of their ravages.—The name **PILL M.** is often given to those shorter *Chilognatha*, of the family *Glomeridæ*, which, when disturbed, roll themselves up into an almost globular form, like the crustacean called

armadillo. *Glomeris marginata* is common in Britain, under stones and among mosses. Some of the tropical species are large and finely colored.

MILLER, Hugh, a distinguished geologist, was born in Cromarty, in the north of Scotland, October 10, 1802. He was descended from a family of sailors, and lost his own father by a storm at sea when he was only five years of age. In consequence of this misfortune, he was brought up chiefly under the care of two of his mother's uncles, one of whom ("Uncle Sandy") imbued him with a taste for natural, and the other ("Uncle James") for traditional history. He acquired a good knowledge of English at the Cromarty grammar-school. Before his 11th year, he had read those glorious romances of childhood, "Jack the Giant-killer," "Jack and the Bean-stalk," "Sinbad the Sailor," "The Yellow Dwarf," and "Aladdin and the Wonderful Lamp," besides several other works of higher literary pretensions. As he grew older, he became extremely fond of the great English poets and prose writers. From his 17th to his 34th year, he worked as a common stone-mason, devoting his leisure hours to independent researches in natural history, and to the extension of his literary knowledge. In 1829, he published a volume, entitled "Poems written in the Leisure Hours of a Journeyman Mason," which was followed, a few years afterwards, by "Scenes and Legends of the North of Scotland." His attention was soon drawn to the ecclesiastical controversies which were agitating Scotland, and his famous "Letter to Lord Brougham" on the "Auchterarder Case," brought him prominently into notice. In 1840, he went to Edinburgh as editor of the "Witness," a newspaper started in the interest of the Non-Intrusion party in the Church of Scotland; and, in the course of the same year, published in its columns a series of geological articles, which were afterwards collected under the title of "The Old Red Sandstone, or New Walks in an Old Field." These articles were very remarkable, both in a scientific and literary point of view. They contained a minute account of the author's discovery of fossils in a formation believed, until then, to be destitute of them, and written in a style which was a harmonious combination of strength, beauty, and polish. At the meeting of the British Association in the same year (1840), he was warmly praised by Murchison and Buckland, and, in fact, his discoveries were the principal topic of discussion among the savans. His editorial labors during the heat of the Disruption struggle were immense, and so seriously injured his health, that for some time he had to give up all literary activity. About 1846, he resumed his pen, and became the most vigorous and eloquent writer in the service of the newly-constituted Free Church. After ten years of hard, earnest, fagging toil, his brain gave way, and, in a moment of aberration, he put an end to his own existence, at Portobello, near Edinburgh, on the night of the 23d, or morning of the 24th December 1866. M.'s principal works, besides those already mentioned, are: "First Impressions of England and its People;" "Footprints of the Creator, or the Asterolepis of Stromness," designed as a reply to the "Vestiges of the Natural History of Creation;" "My Schools and Schoolmasters, or the Story of my Education;" and "Testimony of the Rocks," the last of which is an attempt to reconcile the geology of the Pentateuch with the geology of nature, by the hypothesis, that the days mentioned in the first chapter of Genesis do not represent the actual duration of the successive periods of creation, but only the time occupied by God in unrolling a panoramic vision of these periods before the eyes of Moses.

M.'s services to science have undoubtedly been great, but he is even more distinguished as a man than as a savant. Honest, high-minded, earnest, and hugely industrious, a true Scot, a hearty but not a sour Presbyterian (for he loved Burns as much as he revered Knox), there are few of whom Scotland has better reason to be proud than "the stone-mason of Cromarty." Besides his autobiography quoted above, see Life by Peter Bayne (3 vols. 1871).

MILLER'S THUMB. See BULLHEAD.

MILLET, a grain, of which there are several kinds, the produce of species of *Panicum*, *Setaria*, and allied genera. The genus *Panicum* contains many species, natives of tropical and warm temperate countries, and some of which, as *Guinea Grass* (q. v.), are amongst the largest fodder grasses. The flowers are in spikes, racemes, or panicles; the glumes very unequal, one of them often very minute; each spikelet containing two florets, one of which is often barren. The genus

*Setaria* has a spike-like panicle, with two or more bristles under the glumes of each spikelet.—COMMON M. (*Panicum miliaceum*) is an annual grass, three or four feet high, remarkably covered with long hairs, which stand out at right angles. It has a much-branched nodding panicle; the spikelets are oval, and contain only one seed. It is a native of the East Indies, but is extensively cultivated in the warmer parts of Europe and other quarters of the world. It succeeds only in those climates in which wine can be produced. It is called *Warree*, *Cheena*, and *Kadi-kane* in India. The grain, which is very nutritious, is only about one-eighth of an inch in length. It is used in the form of groats, or in flour mixed with wheat-flour, which makes a good kind of bread; but bread made of M. alone is brittle and full of cracks. Poultry are extremely fond of millet. The straw is used for feeding cattle.—Other species, *P. miliare*, *P. frumentaceum*, and *P. pilosum*, are cultivated in different parts of India, chiefly on light and rather dry soils, yielding very abundant crops.—GERMAN M., or *MOHAR* (*Setaria Germanica*), and ITALIAN M. (*S. Italica*), regarded by many as varieties of one species, and probably originally from the East, although now naturalised in the south of Europe, are cultivated in many of the warmer parts of Europe, in India, and other countries. Italian M. is three or four feet in height; German M. much dwarfier, and its spike comparatively short, compact, and erect; and less valuable as a corn-plant. The grains of both are very small, only about half as long as that of Common M.; but they are extremely prolific, one root producing many stalks, and one spike of Italian M. often yielding two ounces of grain. The produce is estimated as five times that of wheat. Italian M. is called *Koongoonie*, *Kala-kang-nnee*, and *Kora-kang* in India. The grain of these millets is imported into Britain for feeding cage-birds, and for use as a light and pleasant article of food, although for this purpose it is little used in Britain, whilst it is very extensively used in soups, &c., in the south of Europe. It does not make good bread. To the same tribe of grasses belong the genera *Paspalum*, *Pennisetum*, *Penicillaria*, *Digitaria*, and *Milium*—species of which are cultivated in different parts of the world for their grain. *Paspalum exile* is the *Fundi* (q. v.) of Africa; and *P. scrobiculatum* is the *Koda* of India, where it is cultivated chiefly on poor soils. *Penicillaria spicata*, or *Pennisetum typhoides*, is very extensively cultivated in Africa, and to a considerable extent in India. Its cultivation has been introduced into the south of Europe. It succeeds best on light soils. Its Indian name is *Bajree*. It often receives the names EGYPTIAN M. and GUINEA CORN. It has a somewhat spiked cylindrical panicle.—*Pennisetum distichum* abounds in Central Africa, on the southern borders of the Great Desert, where it is called *Uzak*, and is described by Barth as causing much inconvenience to the traveller, the little bristles which are attached to its seeds making them stick like burs to the clothes; they also pierce the skin, and cause sores, so that it is necessary to be provided with small pinners for their extraction, and none even of the wild roving natives is ever without such an instrument. But its seed is a common and pleasant article of food, in some places the principal food of the people, and a pleasant beverage is made from it.—*Digitaria sanguinalis* is called *POLISH M.*, being cultivated in cottage-gardens in Poland, where the grain is used like rice. It is a common grass in many parts of Europe, although very rare in Britain. The spikes in this genus are compound, and from their appearance give it the names *Digitaria* and *Finger-grass*.—The M. GRASS (*Milium effusum*) of Britain, occasionally found in shady woods, is a very beautiful grass, three or four feet high, with a spreading pale panicle of small flowers; and has been much recommended for cultivation as a forage grass, and for the sake of its very abundant small seeds, an excellent food for game. Another species of the same genus (*M. nigricans*) is the *Maize de Guinea* of Peru, where its seeds, after being dried by heat, are converted into a very white flour, a pleasant article of food; and a beverage called *ullpu* is made from them.—The name INDIAN M. is sometimes given to *Durra* (q. v.), but it belongs to a different tribe of grasses from the true millets.

MILLRIND, or Fer de Moulin, in Heraldry, a charge meant to represent a mill-rion, originally a mere variety in designating the cross moline, but accounted a distinct charge by some heralds.

MILMAN, Henry Hart, D.D., an English poet and ecclesiastical historian, was the youngest son of Sir Francis Milman, physician to George III., and was born in London, 10th February 1791. He was educated at Eton, and afterwards at Brasenose

College, Oxford, where he took the degree of M.A., obtained the Newdegate Prize in 1812, published "*Fazio, a Tragedy*" (which was successfully brought upon the stage at Covent Garden), in 1815; took orders in 1817, and, shortly after, was appointed vicar of St Mary's, Reading. In the following year appeared his "*Samor,*" "*Lord of the Bright City,*" "*an Heroic Poem,*" which was followed in 1820 by the "*Fall of Jerusalem,*" a beautiful dramatic poem, with some fine sacred lyrics interspersed. In 1821, M. was chosen Professor of Poetry at Oxford, and published three other poems in the course of the same year—"The Martyr of Autloch," "*Belshazzar,*" and "*Anne Boleyn.*" His "*Sermons at the Bampton Lecture*" appeared in 1827, and his "*History of the Jews*" (3 vols.) in 1829. The last of these works did not bear the author's name; it was written in so liberal and tolerant a spirit, that ecclesiastics of the stricter sort could hardly fail to be offended. Its weak point was a want of adequate learning, especially in the department of biblical criticism. A new edition, greatly improved, and more critical, yet still far from being very accurate, or built on solid foundations, with an interesting preface, was published in 1863. In 1840 appeared a collected edition of his "*Poetical Works,*" containing some other pieces besides those already mentioned. The same year witnessed the publication of his "*History of Christianity from the Birth of Christ to the Abolition of Paganism in the Roman Empire*" (3 vols.). In 1849 he was made Dean of St Paul's; and in 1854 published his master-piece, "*History of Latin Christianity,*" including that of the Popes to the Pontificate of Nicholas V." (3 vols.). It is a work of great learning, liberality, and chastened eloquence; it displays a broad grasp of human nature in its religious workings; besides a philosophic and poetical sympathy with the different men and opinions which it reviews. The work secured for its author a position in the first rank of English historians. M. edited Gibbon, and contributed extensively to the "*Quarterly Review.*" He died in 1868. A posthumous work contains his "*Essays on St Paul,*" "*Savonarola,*" "*Erasmus, &c.*"

MILNE-EDWARDS, Henri, the most eminent living representative of the French school of natural history, was born at Bruges in 1800. His father was an Englishman. M. studied medicine at Paris, where he took his degree of M.D. in 1823, but abandoned medicine to devote himself to natural history. He was first appointed Professor of Natural History in connection with the Lycée Henri Quatre, and afterwards to the Museum and the Faculté des Sciences, of which he is now President. In 1838 he was elected a member of the Academy of Sciences (section of Anatomy and Zoology); and in 1854 was chosen a member of the Académie de Médecine. He is also a member of many other societies, French and foreign, and a commander of the Legion of Honor. M. is distinguished for his extensive knowledge of comparative anatomy and physiology, as well as of zoology. Passing over some of his early works, which, though valuable, are thrown into the shade by his later ones, we come to his "*Monograph on the Crustacea*" (1837-1841), which is universally regarded as of pre-eminent merit, not only for its richness of detail, but also for the value of the general doctrines relating to homologies, development, geographical distribution, and other points of the highest physiological interest. In 1840, an improved edition of his "*Elements of Zoology,*" a work in 4 vols., and containing 600 illustrations, began to appear. In 1841 he published his researches on the Compound Acidian Mollusca, which have led to an entirely fresh appreciation of some of the most important points in the history of that group, such as, that *propagation by gemmation*, which had been previously supposed to be a zoophytic character, is equally true of the lower mollusca. In other departments of science, M. has been equally successful; but it is to the invertebrate animals that his chief attention has been given, and in each of the three Cuvierian sub-kingsdoms, *Articulata*, *Mollusca*, and *Radiata*, his researches have been so important, that what he has accomplished for either alone would suffice to establish for him a high scientific reputation. In 1856 M. obtained the Copley Medal of the Royal Society of London. His later works include "*Lectures on Physiology,*" and on the "*Comparative Anatomy of Men and Animals*" (1855-1857); "*History of the Mammalia*" (1872, & seq.); &c.

MILNER, Joseph, an ecclesiastical historian who once occupied a respectable place in literature, was born near the town of Leeds, in Yorkshire, January 2, 1744. He studied at Catharine Hall, Cambridge, where he took the degree of B.A. in 1766, and afterwards became head-master of the grammar-school

at Hull. In this capacity, his success was very great. Shortly after, he was appointed lecturer in the principal church of the town, and in 1797, vicar of Holy Trinity Church. He died November 15th of the same year. M.'s principal work is his "History of the Church of Christ," of which he lived to complete 8 vols., reaching to the 13th c. (1794); a fourth volume, reaching to the 16th c., was edited from his MSS. by his brother, DR. ISAAC MILNES, Dean of Carlisle, who also published a complete edition of his brother's works in 8 vols., 1810. The principles on which "The History of the Church of Christ" is written are of the narrowest kind; the scholarship is poor, the literary merit still poorer, and the critical insight poorest of all. It deserves mention only for the estimation in which it was formerly held, at a time when the English Church seemed sunk in ignorance and stupor.

MILNES, Richard Monckton, Baron Houghton, English poet and politician, descended from an old Yorkshire family, was born in 1802, and educated at Trinity College, Cambridge. He entered parliament as M.P. for Pontefract in 1837, and continued to represent that borough until the close of the parliamentary session of 1863, when he was called to the Upper House by the title of Baron Houghton. In the House of Commons he began life as a Conservative, but afterwards allied himself to the Liberal party, and was a faithful follower of Lord Palmerston, when his foreign policy and high-handed dealings at the Foreign Office led to the temporary estrangement of that statesman from the Whigs. M. has distinguished himself, however, rather by his philanthropic labors, and his speeches on behalf of the Italians, Poles, and other oppressed nations, than by his devotion to party politics. He has been the advocate of public education and religious equality. He carried, in 1846, a bill for establishing Reformatories, and has taken a great interest in the reform of the criminal classes. M. has also cultivated the muses with grace and success. He has travelled much in oriental countries, and is the author of "Memorials of a Tour in Greece," and also of poems called "Palm Leaves," in which a poetical halo is thrown around the manners and domestic institutions of the East. His "Poems of Many Years," and "Poems, Historical and Legendary," contain many simple and elegant effusions. In 1849, he edited the "Life, Letters, and Literary Remains of John Keats." He has also written "Thoughts on Purity of Election;" "Monographs, Personal and Social" (1873-6); &c. His "Collected Poetical Works" appeared in 1876.

MILO, of Oroton, in Magna Græcia (q. v.), an athlete famous for his great strength, who lived, according to Herodotus, in the time of Darius Hystaspes, about 530 B.C. Among other displays of his strength, he is said to have on one occasion carried a live ox upon his shoulders through the stadium of Olympia, and afterwards to have eaten the whole of it in one day; and on another (reversing the story of the Hebrew Samson), to have upheld the pillars of a house in which Pythagoras and his scholars were assembled, so as to give them time to make their escape when the house was falling. He is said to have lost his life through too great confidence in his own strength, when he was getting old, in attempting to split up a tree, which closed upon his hands, and held him fast until he was devoured by wolves.

MILREE, Milrel, or Milren, a Portuguese silver coin and money of account, contains 1000 rees, and is valued at 4s. 8½d. sterling. The coin is commonly known in Portugal as the *coroa*, or "crown," and is (since 24th April 1835) the unit of the money-system in that country. It is used in Brazil. The half-coron, or half-milrel, of 500 rees, is also used in both countries. The name "milrel" was used in Portuguese accounts long before any coin representing its value existed.

MILTIADES, a celebrated Athenian general, "tyrant of the Chersonese," yet, as Byron sings, "freedom's best and bravest friend." Forced by Darius to flee from his dominions, he took refuge at Athens, and on the second Persian invasion of Greece, his military talents being of a high order, he was chosen one of the ten generals. He particularly distinguished himself by the great victory which he gained at Marathon (q. v.) with a small body of Athenians and 1000 Plataeans (29th September, 490 B.C.) over the Persian host, under Datis and Ariaphernes. By this victory, the Greeks were emboldened for the heroic struggle which they made in defence of their country and their liberty. M. being intrusted with the command of an armament for the purpose of retaliating on the Persians, made an attack on the

island of Paros in order to gratify a private enmity; but failing in the attempt, he was, on his return to Athens, condemned to pay a heavy fine as an indemnification for the expenses of the expedition. Being unable to do this, he was thrown into prison, where he died of a wound received at Paros. The fine was exacted after his death from his son Cimou (q. v.).

MILTON, John, an English poet, was born in Bread Street, London, on the 9th December 1608. His father was of an ancient Catholic family, but was disinherited on becoming Protestant. He followed the occupation of a scrivener, by which, according to Aubrey, "he got a plentiful estate," and was a man of great musical accomplishment, being the composer, among other things, of the two well-known psalm-tunes "Norwich" and "York." From him his son derived his matchless ear, and that strict integrity of character for which he is as famous as for his verse.

M. was carefully nurtured and educated. He was first placed under the care of a private tutor named Young, a Scotchman by birth and education; and at the age of twelve, was sent to St Paul's School, London, and afterwards to Christ's College, Cambridge. According to the University Register, he was admitted 12th February 1624-1625. He took his degree of M.A.; and having relinquished the idea of following divinity or law, he left Cambridge in 1632, and went to live at his father's house at Horton, in Buckinghamshire. There, in serenity of mind and passion, he lived five years, reading the Greek and Latin poets, and composing "Comus," "Lycidas," "Arcades," "L'Allegro," and "Il Penseroso." On the death of his mother in 1637, he went abroad, visiting the chief Italian cities, and making the acquaintance of Grotius and Galileo. While travelling, being made aware that clouds were gathering in the political atmosphere at home, he returned in 1639, and engaged himself with the tuition of his nephews—on which portion of M.'s life, Dr Johnson could not help looking with "some degree of merriment." In 1641, he engaged in the controversies of the times, and in the course of that and the following year, he issued the treatises "Of Reformation," "The Reason of Church Government urged against Prelacy," "Prelatical Episcopacy," and "An Apology for Smectonimus." In 1643, he married rather suddenly Mary, daughter of Richard Powell, an Oxfordshire royalist, but the union did not at first prove happy. His wife, who had been accustomed to "dance with the king's officers at home," found her husband's society too austere and philosophic for her gay tastes. After the severe honeymoon was over, she obtained permission to visit her relatives till Michaelmas; but when Michaelmas came, she refused to return. Stern and proud, M. repudiated her at once; and the matrimonial disagreement made the world the richer by four "Treatises on Divorce." A reconciliation, however, took place, which, we have no reason to doubt, was both genuine and permanent. Mary Powell died in 1652-1653, leaving him three daughters, Ann, Mary, and Deborah, of whose undutifulness and ingratitude we have latterly many complaints. In 1644 he produced his "Tractate on Education" and his "Areopagitica"—a flame of eloquence at which one may warm one's hands yet. After the execution of Charles, he was appointed Latin secretary to the Council of State, with a salary of £290. In his new position, his pen was as terrible as Cromwell's sword. In "Elkonoklastes," he made a savage but effective reply to the famous "Elkon Basilike;" and in his "Pro Populo Anglicano Defensio" he assailed his opponent, Claude de Saumaire, better known as *Salmasius*, with such a storm of eloquence and abuse, that the latter, who died at Spa in 1653, is believed to have lost his life through chagrin. M. at least flattered himself with having "killed his man." His second wife, whom he married 12th November 1656, was a daughter of Captain Woodcock of Hackney. She died in childbirth in February 1653, and her husband has enshrined her memory in an exquisitely pure and tender sonnet.

Unceasing study had affected his eyesight, and about 1654, M. became totally blind. After the Restoration, he retired from affairs; he was obnoxious to the reigning power, and it is said that he was once in custody of the sergeant-at-arms. On the Publication of the Act of Oblivion, he married his third wife, Elizabeth Minshull, and shortly after removed to a house in Artillery Walk, when he was busy with "Paradise Lost." This great poem was originally planned as a mystery, then some idea of treating it as a drama haunted the author's mind; finally, however, he resolved to write an epic poem on the Fall of Man. The poem was published in 1667. He received five pounds from his publisher, and a promise of other five

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pounds when 1300 copies should have been sold. In 1670, he published his "History of England." Next year, he printed "Paradise Regained and Samson Agonistes." He died on Sunday, the 8th November 1674, and was buried next his father, in the chancel of St Giles, at Cripplegate. He left property to the value of £1500.

M. was, above all English poets, stately and grandiose. He arrived early at the knowledge of his powers, and did not scruple, in one of his prose tracts, to inform his readers that he purposed to write a poem which would be considered one of the glories of his country. Drawn away for a time by the heats of controversy and by official tasks, he never forgot his pledge, and redeemed it at last in old age, blindness, and neglect. In comparison, other poets are like sailing-ships, at the mercy of the winds of Passion and Circumstance; he resembled the ocean-steamer, which, by dint of internal energy, can pierce right through the hurricane. Never, perhaps, was a mind more richly furnished. His careless "largess" is greater than the fortunes of other men. His "Comus" is the very morning-light of poetry; while in his great epic there is a massiveness of thought, a sublimity of imagery, a pomp of sound—as of rolling organs and the outbursting of cathedral choirs—which can be found nowhere else. His great passages echo in the mind as if loth to die. Of all great writers, he is perhaps the one for whom we are conscious of the least personal affection, and this arises from a certain hauteur and severity which awes—which repels some natures; yet he infects his reader with his own seriousness. A most serviceable edition of his poetical works is that by Professor Masson, 3 vols. 1874. See also Masson's "Life and Times of M." (5 vols. 1858—79).

MILWAU'KEE, a city of Wisconsin, United States of America, on the western shore of Lake Michigan, at the mouth of Milwaukee River or Creek, which forms its harbor. The town, beautifully built with light yellow bricks, crowns a high bluff on the lake, and contains county buildings, custom-house, and post-office, 69 churches, public schools, female college, banks, insurance companies, asylums, hospital, and many daily and weekly papers. Several railways connect the city with a country of great fertility. In extent of marine commerce, M. ranks fourth among the cities of the union; and it has great advantages as a manufacturing centre. The grain received at M. in 1878 amounted to 83,963,315 bushels. Pop. (1890) 45,264; (1870) 71,440; (1890) 115,587.

MIMĀNSĀ (from the Sanscrit *mān*, to investigate; hence, literally, investigation) is the collective name of two of the six divisions of orthodox Hindu philosophy. See SANSCRIT LITERATURE. It is distinguished as *Pāra* and *Uttara-mīmāṃsā*, the latter being more commonly called *Vedānta* (q. v.), while the former is briefly styled *Mīmāṃsā*. Though the M. is ranked, by all native writers, with the five other philosophical systems, the term philosophy—as understood in a European sense—can scarcely be applied to it; for the M. is neither concerned with the nature of the absolute or of the human mind, nor with the various categories of existence in general—topics dealt with more or less by the other five philosophies; its object is merely to lay down a correct interpretation of such Vedic passages as refer to the Brāhmaṇic ritual, to solve doubts wherever they may exist on matters concerning sacrificial acts, and to reconcile discrepancies—according to the M., always apparent only—of Vedic texts. The foundation of this system is therefore preceded by a codification of the three principal Vedas—the R'ik, Black-Yajus, and Sāman—and by the existence of schools and theories which, by their different interpretations of the Vedic rites, had begun to endanger, or, in reality, had endangered a correct, or at least authoritative understanding of the Vedic texts. It is the method, however, adopted by the M. which imparted to it a higher character than that of a mere commentary, and allowed it to be looked upon as a philosophy; for, in the first place, the topics explained by this system do not follow the order in which they occur in the Vedic writings, especially in the Brāhmaṇa portion of the Vedas (q. v.); they are arranged according to certain categories, such as authoritativeness, indirect precept, concurrent efficacy, co-ordinate effect, &c.; and secondly, each topic or case is discussed according to a regular scheme, which comprises the proposition of the subject-matter, the doubt or question arising upon it, the *primā-faciē* or wrong argument applied to it, the correct argument in refutation of the latter, and the conclusion devolving from it. Some subjects treated of in the M., incidentally as it were, and merely for the sake of argument, belong likewise more to the sphere of phi-

losophic thought than to that of commentatorial criticism, such, for instance, as the association of articulate sound with sense, the similarity of words in different languages, the inspiration or eternity of the Veda, the invisible or spiritual operation of pious acts, &c. The reputed founder of this system is Jainini—of unknown date—who taught it in twelve books, each subdivided into four chapters, except the third, sixth, and tenth books, which contain eight chapters each; the chapters, again, are divided into sections, generally comprising several Sûtras or aphorisms, but sometimes only one. The extant commentary on this obscure work is the "Bhāṣhya" of 'Sābara-swāmin, which was critically annotated by the great M. authority, Kumārila-swāmin. Out of these works, which, in their turn, quote several others, apparently lost, has arisen a great number of other writings, explaining and elucidating their predecessors. The best compendium, amongst those modern works, is the "Jainini-nyāya-mālā-vistara," by the celebrated Mādhavāchārya (q. v.).

**MIMES**, the name given by the ancients to certain dramatic performances, in which, with little attempt at art, scenes of actual life were represented, sometimes in improvised dialogue. The Greek mimes appear to have been invented by the Greeks of Sicily and Southern Italy. They were a favorite amusement of convivial parties, the guests themselves being generally the performers. Sophron of Syracuse, about 420 B.C., composed many in the Doric dialect, which were much admired, and which Plato was accustomed to read.—The Roman mimes were not borrowed from the Greek, but were of native Italic growth. They were not only far ruder and coarser, but in some respects they were essentially different—the dialogue occupying a smaller place, and mere gesture and mimicry predominating. The humor and satire, however, were often genuine, though rough, and even indecent, and they were greatly relished by all classes; even the patrician Sulla was found of them.

**MIMOSEÆ**, a sub-order of *Leguminosæ*, one of the largest natural orders of exogenous plants; distinguished by regular flowers and petals valvate in bud. About 1000 species are known, all natives of warm climates, a few only extending beyond sub-tropical regions in the southern hemisphere. The genera *Acacia* (q. v.) and *Mimosa* are the best known. To the latter genus belong the Sensitive Plants (q. v.). Some of the larger species of M. are valuable timber trees. The *TALHA* (*Mimosa ferruginea*) is one of the most common trees of Central Africa. They are also trees of great beauty. Some species of the genus *Prosopis*, natives of the western parts of South America, are remarkable for the abundance of tannin in their pods.

**MIMULUS**, a genus of plants of the natural order *Scrophulariaceæ*, having a prismatic 5-toothed calyx, a somewhat bell-shaped corolla, of which the upper lip is bilid and the lower lip trifid, the lobes not very unequal, two long and two short stamens, and a stigma of two lamellæ, which close together upon irritation. The species are mostly herbaceous plants, natives of America. Some of them are very frequent in flower-gardens, and many fine varieties have resulted from cultivation. They sometimes receive the name of *Monkey-flower*. One species, *M. luteus*, a native of Peru and Chili, has become naturalised in many parts of Britain. The little yellow-flowered **MUSK PLANT**, now so common in gardens and on window-sills in Britain, is *M. moschatum*, a native of Oregon and other north-western parts of America.

**MINA**, or Mna, the name of a Greek weight and money denomination, derived from an oriental word *maneh*, signifying "weight." The mina contained 100 Drachmæ (q. v.), and was the sixtieth part of a talent; consequently, as a weight, it was equivalent to about  $1\frac{1}{4}$  of a pound avoirdupois, varying in different districts to the extent of one-third of a pound more or less, following the fluctuations of the talent itself. As a money of account, it preserved the same relation to the talent, and was worth £4, 1s. 3d. See **TALENT**.

**MINA BIRD** (*Bulabes Indicus* or *Gracula Indica*), a species of Grackle (q. v.), or of a nearly allied genus, a native of many parts of the East Indies, about the size of a common thrush, of a deep velvety black color, with a white mark on the base of the quill-feathers of the wings, yellow bill and feet, and two large bright yellow wattles at the back of the head. The bill is large, conical; the upper mandible a little curved, and sharp-pointed. The food of the M. B. consists of fruits and in-



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**secta.** It is very lively and intelligent, and possesses a power of imitating human speech, excelled by none of the parrots. It has sometimes been trained to repeat sentences of considerable length. It is therefore in great request, and is often brought to Europe.—Another and larger species is found in Sumatra and some of the other eastern islands, possessing the same power of articulation. It is highly prized by the Javanese.

**MI'NARET**, Minar, a tall turret, used in Saracenic architecture. It contains a staircase, and is divided into several stories, with balconies from which the priests summon the Mohammedans to prayer—bells not being permitted in their religion—and is terminated with a spire or ornamental finial. The minarets are amongst the most beautiful features of Mohammedan architecture, and are an invariable accompaniment of the Mosques (q. v.). In India, *Minars*, or pillars of victory, are frequently erected in connection with mosques; some of these are lofty and splendid monuments, that of Kootub, at old Delhi, being 48 feet 4 inches in diameter at base, and about 250 feet high. They are often built on a plan of a star-like form, and are divided into stories by projecting balconies, like the minarets.

**MINCH**, the channel which separates the island of Lewes from the counties of Cromarty and Ross, in the north-west of Scotland. Its shores are exceedingly irregular, and its average width is about 28 miles. The *Little Minch*, which separates the island of Skye from that of North Uist and the neighboring islands in the Outer Hebrides, is upwards of 15 miles in width.

**MI'NCIO** (anc. *Mincius*), a river of Northern Italy, a continuation of the Tyrol-ese stream, the Sarca, emerges from Lake Garda at Peschiera, and after a course of about 98 miles through the province of Mantua, which it separates from Verona, falls into the Po, 8 miles below the city of Mantua. The M. has constituted an important basis of operation during the wars between Italy and Austria.

**MIND.** Having adverted in various other articles—**EMOTION**, **INTELLECT**, **WILL**, &c.—to the chief component parts of our mental constitution, all that is necessary under the present head is to consider the definition or precise demarcation of mind as a whole. In this subject, we cannot resort to the common method of defining, which is to assign something more simple and fundamental than the thing to be defined; as when we define gravity to be an *attractive force*, the notions of force and attraction being supposed to be more intelligible than gravity. Mind can be resolved into nothing more fundamental than itself; and therefore our plan must be, to call attention to those individual facts or experiences that are pointed at by the name, and to circumscribe, in some way or other, the whole field of such experiences. For an example of mind, we should probably refer each person to his pleasures and pains, which are a class of things quite apart and peculiar; we should also indicate thoughts or ideas, as mental elements; also exercises of will or voluntary action. There is a sufficient community of nature in those various elements to cause them to be classed by themselves, under a common designation, namely, mind. If any one could be made aware of all the phenomena that have received this designation, he would of course know the meaning in the detail; but this is not enough. Mind being a general or comprehensive name, we ought to see distinctly the common character or attribute pervading all those particular phenomena; the recognition of this common character is the knowledge of mind in general, or the determination of its defining attribute. For the settling of this common attribute, we have another great resource, besides comparing the individual facts, that is, to determine the opposite, or contrast of mind. Now the usually assigned contrast is matter; but more precisely, it is extension, or the *extended*, including both inert matter and empty space. When we are conscious of anything as having the property of Extension, our consciousness is occupied with the object world, or something that is not mind. When we are feeling pleasure or pain, remembering, or willing, we are not conscious of anything extended; we are said to be in a state of subjective consciousness, or to be exhibiting a phenomenon of mind proper. Hence, philosophers are accustomed to speak of the *intended mind*, as distinguished from the outer or object world. In one sense, everything that we can take cognizance of is mind or self; we cannot by any possibility transcend our own mental sphere; whatever we know, is our own mind; hence the idealism of Berkeley, which seemed to annihilate the whole external universe. But

this large sense of mind is not what is usually meant, and whatever view we take of the reality of the external world, we must never merge the distinction between the consciousness of the Extended—which is also coupled with other truly object properties, as inertia, for matter—and the consciousness of the Inextended, as constituting our feelings and thoughts. This opposition is fundamental and ineradicable, and is expressed in language by a variety of designations; mind and not mind, subject and object, internal and external. The laws and phenomena of the Extended are set forth in the sciences of the external world—Mathematics, Mechanics, Chemistry, &c.; the laws of the Mind proper, or the Subject consciousness, are quite distinct in their nature, and are embodied in a separate science, called Mental Philosophy, Psychology, &c.

**MINDANA'O.** See PHILIPPINE ISLANDS.

**MINDEN**, a Prussian town, in the province of Westphalia, lies on the Weser, is a prosperous, closely built city, with a population of (1875) 17,098. It was till lately a fortress of the second class. M., which ranks as one of the oldest towns in Germany, has a stone bridge across the river, originally erected in 1618, and possesses several ancient churches, the most noteworthy of which are the present Roman Catholic church. Built in the second half of the 11th century, it was till 1811 an episcopal cathedral. A battle was fought near M. in 1759, in which the French were defeated by an army of Anglo-Hanoverian troops.

The Hanoverian town of M. or *Münden* is situated in the district of Hildesheim, within the province of Göttingen, and at the confluence of the Fulda and Werra. Pop. (1875) 5616. M. lies in one of the most picturesque and fruitful parts of Hanover. It has 3 breweries and manufactories of china, earthenware, sugar, tobacco, and linen, with a noted linen-market. There are alum-works and good coal-mines in the immediate neighborhood; and it has an extensive river transport-trade in millstones, corn, and timber. M. possesses several architectural remains, indicative of its former more prosperous condition.

**MINDSZENT**, a town of Hungary, in the county of Csongrad, near the left bank of the Theiss, and just below the mouth of the Saros, 19 miles north from Szegedin. Pop. (1869) 9414.

**MINE'O**, a town of the island of Sicily, in the province of Catania, 82 miles south-west of Messina. It is supposed to occupy the site of the ancient *Meneæ*, founded by Ducetius, 469 B.C. Pop. 9500.

**MINERAL CHAMELEON.** See MANGANESE.

**MINERAL KINGDOM**, the inorganic portion of nature. Under this term, however, are not included the inorganic products of organic beings, as sugar, resins, &c., although substances more remotely of vegetable or even animal origin are reckoned among minerals, as coal, fossils, &c. To the Mineral Kingdom belong liquid and gaseous, as well as solid substances; water, atmospheric air, &c., are included in it. All the chemical elements are found in the Mineral Kingdom, from which vegetable and animal organisms derive them; but many of the compounds which exist in nature belong entirely to the vegetable and animal kingdoms, and are produced by the wonderful chemistry of life.

**MINERAL RESINS.** See RESINS.

**MINERAL TALLOW**, or Hatchetine, a remarkable substance found in several places in Britain, Germany, Siberia, &c., soft and flexible, yellowish white, or yellow, resembling wax or tallow, often flaky like spermaceti, inodorous, melting at 115°–170° F., and composed of about 86 carbon and 14 hydrogen.

**MINERAL WATERS.** This term is usually applied to all spring waters which possess qualities in relation to the animal body different from those of ordinary water. Mineral waters have been used as remedial agents from a very early period. The oldest Greek physicians had great faith in their curative power, and the temples erected to *Æsculapius* were usually in close proximity to mineral springs; they had recourse to the sulphurous thermal springs of Tiberias (now Taberah), which are still used by patients from all parts of Syria in cases of painful tumor, rheumatism, gout, palsy, &c., and to the warm baths of Calirrhoe, near the Dead Sea, which are mentioned by Josephus as having been tried by Herod in his sickness. We are in-

debted to the Romans for the discovery not only of the mineral thermic springs in Italy, but of some of the most important in other parts of Europe, amongst which may be named Aix-la-Chapelle, Baden-Baden, Bath, Spa in Belgium, and many others; and Pliny, in his "Natural History," mentions a very large number of mineral springs in almost all parts of Europe.

The therapeutic action of mineral waters, or of spas, as they are frequently termed, depends chiefly upon their chemical composition and their temperature, although a variety of other circumstances, as situation, elevation, climate, geological formation, mean temperature, &c., have an important bearing upon the success of the treatment.

The best time for undergoing a course of mineral waters is, in the majority of cases, the months of June, July, August, and September. There are, however, exceptions depending upon climate; for example, at Gastein, celebrated for its thermal springs, the weather is changeable and stormy in June and July, but pleasant in May, August, and September. Early rising is usually advisable during a course of mineral waters, and, as a general rule, the water should be drunk before breakfast, at intervals of about a quarter of an hour between each tumbler, moderate exercise being taken in the intervals. In many cases, bathing is of even greater importance as a remedial agent than drinking. Baths are generally taken between breakfast and dinner; and should never be taken soon after a full meal. The time during which the patient should remain in the bath varies very much at different spas, and the directions of the local physician should be strictly attended to on this point. It is impossible to determine beforehand how long a course of mineral waters should be continued, as this entirely depends upon the symptoms observed during treatment. As a general rule, the treatment should not be protracted beyond the space of six weeks or two months, but on this point the patient must be solely guided by the physician resident at the spa. It cannot be too forcibly impressed upon the patient, that indulgence in the pleasures of the table, and excesses of any kind, frequently counteract the salutary effects of the waters, while perfect mental relaxation is an important auxiliary to the treatment. It will be seen from remarks on the nature of the cases likely to receive benefit from the various kinds of mineral waters, that spas are only suitable for patients suffering from chronic disorders.

No classification of mineral waters based upon their chemical composition can be strictly exact, because many springs are, as it were, intermediate between tolerably well characterised groups. The following classification, which is adopted by Dr Althaus, in his "Spas of Europe" (Lond. 1862), is perhaps the most convenient: 1. Alkaline Waters; 2. Bitter Waters; 3. Muriated Waters; 4. Earthy Waters; 5. Indifferent Thermal Waters; 6. Chalybeates; 7. Sulphureous Waters.

1. The Alkaline Waters are divisible into: (a) *Simple Alkaline Acidulous Waters*, of which the chief contents are carbonic acid and bicarbonate of soda. The most important spas of this class are the thermal springs of Vichy and the cold springs of Pachelingen, Gellman, and Billin. These waters are useful in certain forms of indigestion, in jaundice arising from catarrh of the hepatic ducts, in gall-stones, in renal calculi and gravel, in gout, in chronic catarrh of the respiratory organs, and in abdominal plethora. Vichy (q. v.) may be taken as the representative of this class of springs. (b) *Muriated Alkaline Acidulous Waters*, which differ from the preceding sub-group in additionally containing a considerable quantity of chloride of sodium. The most important spas of this kind are the thermal springs of Ems, and the cold springs of Selters, Luhatschowitz, and Salzbrunn. They are useful in chronic catarrhal affections of the bronchial tubes, the stomach, and the intestines, and the larynx; and the Ems waters possess a high reputation in certain chronic diseases of the womb and adjacent organs. (c) *Alkaline Saline Waters*, of which the chief contents are sulphate and bicarbonate of soda. The most frequented of these spas are the warm springs of Carlsbad and the cold springs of Marienbad. Patients suffering from abdominal plethora are those most frequently sent to these spas, which often prove of great service, if the stagnation of the blood is owing to habitual constipation, pressure from accumulated feces, or congestion of the liver, unconnected with diseases of the heart or lungs. These waters, especially those of Carlsbad, afford an excellent remedy for the habitual constipation which so frequently arises from sedentary occupations; the result being much more permanent than that produced by strong purgative waters.

2. The chief contents of the Bitter Waters are the sulphates of magnesia and soda; and the best known spas of this class are those of Pálma, Salschütz, Sedlitz, Friedrichshall, and Kissingen; although there are two English spas—namely, the bitter water of Cherry Rock, near Kingswood, in Gloucestershire, and the Purton Spa, near Swindon, in Wiltshire—which “are, by their chemical composition, admirably suited for the treatment of many cases of disease, and may perhaps even prove superior to the continental spas of this class.”—Althaus, *op. cit.* p. 360. These waters act both as purgatives and diuretics, and may therefore be used advantageously in the numerous cases in which it is advisable to excite the action both of the bowels and kidneys.

3. The Muriated Waters are divisible into: (a) *Simple Muriated Waters*, of which the chief contents are a moderate quantity of chloride of sodium or common salt. The chief spas of this class are Wiesbaden and Baden-Baden, which are hot; those of Soden (in Nassau), of Mondorf (near Luxembourg), and of Canstatt (near Stuttgart), which are tepid; and those of Kissingen, Homburg, and Cheltenham, which are cold. They are chiefly employed in cases of gout, rheumatism, scrofula, and abdominal plethora. (b) *Muriated Lithia Waters*, of which the chief contents are the chlorides of sodium and lithium. The discovery of lithia in some of the Baden-Baden springs is so recent that there is as yet no sufficient experience concerning their therapeutic action. In gout, they first aggravate the pain, but then give relief; and in periodic headache, they have been found serviceable. (c) *Brines*, whose chief contents are a large amount of chloride of sodium. Amongst the spas of this kind, those of Rehme, in Westphalia, and Nauheim, in Hesse, have the greatest reputation. They are mostly employed for bathing, and are often of much service in scrofula, anæmia, rheumatism, certain forms of paralysis, and catarrh of the mucous membranes. (d) *Iodo-bromated Muriated Waters*, in which, besides a moderate quantity of chloride of sodium, the iodides and bromides of sodium and magnesium are contained in an appreciable quantity. Kreuznach is the most celebrated of the spas of this class. Its waters are used both for drinking and bathing, and are of service in scrofulous infiltrations of the glands, in scrofulous ulcers, in chronic inflammation of the uterus and ovaries, &c. The waters of Hall, in Austria Proper, are also of this class, and have a high reputation in cases of brouchocele or goitre.

4. *Earthy Waters*, of which the chief contents are sulphate and carbonate of lime. The most important waters of this class occur at Wildungen, Leuk, Bath, Lucca, and Pisa. The Wildungen water, which is exported in large quantities, is, according to Dr Althaus, “a capital diuretic, and not only promotes the elimination of gravel and renal calculi, but by its tonic action on the mucous membrane of the urinary passages, serves to prevent the formation of fresh concretions. It is also much used for chronic catarrh of the bladder, neuralgia of the urethra and neck of the bladder, dysuria, and incontinence of urine.” The baths of Leuk, in which many patients remain nine hours daily (viz., from 4 A.M. to 10 A.M., and from 2 P.M. to 5 P.M.), until an eruption appears, are chiefly used in chronic skin diseases. The waters of Bath, Pisa, and Lucca, which are thermal, are useful in chronic skin diseases, scrofula, gout, rheumatism, &c.

5. *Indifferent Thermal Waters*, which usually contain a small amount of saline constituents. Of the spas of this class, the most important are Gastein (95° to 118°), Toplitz (120°), Wildbad (96°), Warmbrunn (100°), Clifton (86°), and Buxton (82°). Their most striking effects are to stimulate the skin and excite the nervous system. “They are especially used in chronic rheumatism and atonic gout; in diseases of the skin, such as prurigo, psoriasis, lichen; in neuralgia and paralysis due to rheumatic and gouty exudations, to parturition, or to severe diseases, such as typhoid fever and diphtheria; in hysteria; and in general weakness and marasmus.”—Althaus, *op. cit.* p. 421.

6. *Chalybeate Waters*, which are divisible into: (a) *Simple Acidulous Chalybeates*, whose chief contents are carbonic acid and bicarbonate of protoxide of iron; and (b) *Saline Acidulous Chalybeates*, whose chief contents are sulphate of soda and bicarbonate of protoxide of iron. These waters are considered in a special article. See CHALYBEATE WATERS.

7. *Sulphurous Waters*, which contain sulphuretted hydrogen or metallic sulphides (sulphurets), or both. The most important sulphurous thermals are those of Aix-

Minera'logy  
Minerva

la-Chapelle, Baden (near Vienna), Barèges, Eaux-Chaudes, and Bagnères de Luchon; whilst amongst the cold sulphurous springs, those of Neundorf (in Hesse-Nassau) and Harrogate are of great importance. They are extensively used in chronic diseases of the skin, and are of service in many cases in which exudations require to be absorbed, as in swellings of the joints, in old gunshot wounds, and in chronic gout and rheumatism. In chronic laryngeal and bronchial catarrh, they frequently give relief, and in chronic poisoning by lead or mercury, they favor the elimination of the poison, although to a far less degree than iodide of potassium taken internally. The sulphurous waters are employed externally and internally, and mineral mud-baths are believed by many physicians to form a valuable auxiliary to this treatment.

For further information on this subject, the reader is referred to the work of Dr Althaus (of which free use has been made in this article), and to the "Dictionnaire Général des Eaux Minérales et d'hydrologie Médicale" of MM. Durand-Fardel, Le Bret, and Lefort.

**MINERA'LOGY** (Fr. *miner*, to dig, mine; Gael. *meinn*; Wel. *mun*, ore, mine), the science which treats of minerals. But it does not embrace all that relates to the mineral kingdom. *Simple minerals* alone, or homogeneous mineral substances, are regarded as the subjects of mineralogy; rocks formed by the aggregation of simple minerals, and their relations to each other, are the subjects of Geology (q. v.). This limitation of the term mineralogy is comparatively recent. Geology or geognosy was formerly included in it. The arrangement and description of simple minerals according to their external characters, has been called by Werner and others *Oryctognosy*, but the term has fortunately fallen into disuse. Nor is the study of mere external characters sufficient in mineralogy. The chemical composition of minerals equally demands attention. In the classification of minerals, some mineralogists, as Mohs and Jameson, have regarded only the external characters, and some, as Berzelius, only the chemical composition; but the results have been unsatisfactory, and the present tendency is in favor of a system which seeks to constitute natural groups by having regard to both.

Some minerals being of great use, and others highly valued for their beauty, have received much attention from the earliest ages. But the ancient naturalists describe few minerals. The first attempt at scientific mineralogy was by George Agricola in the 16th century. The systems of the Swedes Wallerius and Cronstedt, in the latter half of the 18th c., were the first worthy of the name. That of Werner followed, and was extensively adopted. The discoveries of Haüy in crystallography, and the progress of chemistry, gave mineralogy a new character; and then sprang up two schools of mineralogists, one resting chiefly on external characters, and the other on chemical composition.

The chemical classification of minerals is rendered difficult by the endless variety of combination and proportion in the elements of which they are composed, the presence of substances not essential to the mineral, and yet more or less affecting its characters, and the frequent impossibility of determining what is to be deemed essential, and what accidental. Chemical purity is almost never found in nature. Even the purest diamond, when burned, leaves some traces of ash; and the various colors of diamond, quartz, and other minerals are due to the presence of substances which are often in so small quantity as not to affect their crystalline forms or other physical properties. Again, some minerals of identical chemical composition differ in their crystallisation, so that an arrangement founded upon it would separate them too widely. There are also many minerals which are often found in an uncrystallised state, and others which are always so. In the arrangement of minerals into natural groups, their chemical composition, although not alone to be regarded, is of the first importance, so that the place of a new mineral in the system can never be determined without analysis; and in determining the nature of a mineral, chemical tests, such as the application of acids, are continually resorted to. It is also necessary to know its specific gravity, and how it is acted upon both by a moderate heat and by the blowpipe. An examination of the crystalline forms, with measurement of the angles of the crystals, is often sufficient to distinguish minerals which have otherwise much resemblance. The *cleavage* of crystals is also important, a readiness to split in planes parallel to certain of their faces only, by which the *primitive form* of the crys-

tal may be ascertained. Minerals not crystallised exhibit important varieties of structure, as *laminated, fibrous, granular, &c.* Certain peculiarities of form are also frequently characteristic of uncrystallised minerals, as *mamillary, botryoidal, &c.* Minerals exhibit, when broken, very different kinds of fracture, as *even, conchoidal, splintery, &c.* *Opaqueness, translucency, and transparency,* are more or less characteristic of different kinds; *electric and magnetic* properties demand attention; and very important characters are derived from *lustre*, which in some minerals is *metallic*, in others *semi-metallic*, in others *pearly, vitreous, &c.* *Color* is not generally of much importance, but in some minerals it is very characteristic. *Hardness and tenacity* are very important, and are of all various degrees. A few fluid, and even a few gaseous substances, are included in mineralogical systems. *Unguentous* and other peculiarities to be ascertained by the touch, are very characteristic of some minerals; peculiarities of *taste and smell* belong to others.

Minerology has very important relations with geology, which cannot be studied without regard to the mineral constituents of rocks. The mineral composition of soils greatly affects vegetation and agriculture. The economical uses of minerals are also very important and various. It is enough merely to allude to coal, lime, salt, and the metallic ores. Naphtha, petroleum, bitumen, asphalt, &c., are of well-known utility; and a high value has always been attached to gems and other ornamental stones.

**MINERVA**, the name of a Roman goddess, identified by the later Græcising Romans with the Greek *Athena*, whom she greatly resembled, though, like all the old Latin divinities, there was nothing anthropomorphic in what was told concerning her. Her name is thought to spring from the same root as *mens* (the mind), and *monere* (to warn or advise); and the ancient Latin scholar and critic, Varro, regarded her as the impersonation of divine thought—the plan of the material universe of which Jupiter was the creator, and Juno the representative. Hence all that goes on among men, all that constitutes the development of human destiny (which is but the expression of the divine idea or intention), is under her care. She is the patroness of arts and trades, and was invoked alike by poets, painters, teachers, physicians, and all kinds of craftsmen. She also guided heroes in war; and, in fact, every wise idea, every bold act, and every useful design, owes something to the high inspiration of this virgin goddess. Her oldest temple at Rome was that on the Capitol, but she had another on the Aventine. Her festival was held in March, and lasted five days, from the 19th to the 23d inclusive.

**ATHENE, or PALLAS ATHENE**, the Greek goddess corresponding, as we have said, to the Roman Minerva, was one of the few truly grand *ethical* divinities of Greek mythology. Different accounts are given of her origin and parentage, probably from the jumbling together of local legends; but the best known, and in ancient times, the most orthodox version of the myth represented her as the daughter of Zeus and Metis. Zeus, we are told, when he had attained supreme power after his victory over the Titans, chose for his first wife Metis (Wisdom); but being advised by both Uranus and Gæa (Heaven and Earth), he swallowed her, when she was pregnant with Athene. When the time came that Athene should have been born, Zeus felt great pains in his head, and caused Hephestus (Vulcan) to split it up with an axe, when the goddess sprang forth—fully armed, according to the later stories. Throwing aside the thick veil of anthropomorphism which conceals the significance of the myth, we may see in this account of Athene's parentage an effort to set forth a divine symbol of the combination of power and wisdom. Her father was the greatest, her mother the wisest of the gods. She is literally born of both, and so their qualities harmoniously blend in her. It is possible that the constant representation of her as a strictly maiden goddess, who had a *real*, and not a merely *prudish* antipathy to marriage, was meant to indicate that qualities like hers could not be mated, and that, because she was perfect, she was doomed to virginity. She was not, however, a cold unfeeling divinity; on the contrary, she warmly and actively interested herself in the affairs of both gods and men. She sat at the right hand of Zeus, assisting him with her counsels; she helped him in his wars, and conquered Pallas and Encelados in the battles of the giants. She was the patroness of agriculture, invented the plough and rake, introduced the olive into Africa, and (in harmony with her character as the personification of active wisdom) taught men

the use of almost all the implements of industry and art; and is said to have devised nearly all feminine employments. Philosophy, poetry, and oratory were also under her care. She was the protectress of the Athenian state, was believed to have instituted the court of justice on Mars' Hill (the Areiopagus). As a warlike divinity, she was thought to approve of those wars only which were undertaken for the public good, and conducted with prudence; and thus she was regarded as the protectress in battle of those heroes who were distinguished as well for their wisdom as their valor. In the Trojan wars, she favored the Greeks—who, in point of fact, were in the right. Her worship was universal in Greece, and representations of her in statues, busts, coins, reliefs, and vase-paintings were and are numerous. She is always dressed, generally in a Spartan tunic, with a cloak over it, and wears a helmet, beautifully adorned with figures of different animals, the ægis, the round Argolic shield, a lance, &c. Her countenance is beautiful, earnest, and thoughtful, and the whole figure majestic.

**MINERVINO**, a town of Southern Italy, in the province of Bari, called the *Balcony of Puglia*, from the extensive view it commands of several cities. It stands on a fine hill, and enjoys excellent air. Pop. 13,800.

**MINES**, in Law. In England and Ireland, the crown has the right to all mines of gold and silver; but where these metals are found in mines of tin, copper, iron, or other baser metal, then the crown has only the right to take the ore at a price fixed by statute. As a general rule, whoever is the owner of freehold land, has a right to all the mines underneath the surface, for his absolute ownership extends to the centre of the earth. When the land is given by will or otherwise to a tenant for life, while a third party has the reversion, then the tenant for life is held to be entitled not to open mines which have never before been opened, but to carry on such as have been opened, and are going mines. So in the case of a lease of lands for agricultural purposes, if nothing is said as to mines, the tenant is not entitled to open any mines, for that would be committing waste. It is not uncommon for one person to be owner of the surface of the land, and another to be owner of the mines beneath; or several persons may be owners of different kinds of mines lying above each other in the different strata. Many questions have been raised lately between railway companies and mine-owners as to their respective rights and liabilities. When a railway passes through a mining country, it is generally optional with the owner to sell to the company merely the surface of the lands, reserving to himself the mines beneath; and it is usually provided that, if ever the owner work his mines so near to the railway as to endanger its stability, the company must have notice of that fact, and then, if necessary, may purchase the mines immediately under the railway. But the courts have determined that even though the owner of the land reserve his right to minerals, he is nevertheless prevented, by common law, from working the mines immediately under the railway, so as to endanger the use of the railway. In these matters the law of Scotland does not at all differ, though, as to other points of the common law, some differences of no great importance occur. See Paterson's "Compendium of English and Scottish Law."

The practical working of mines and collieries in any part of Great Britain has been controlled by certain recent acts of parliament, with a view to insure the greater safety of the persons working them, and to prevent the employment of women and children. Thus, the owners of mines are prohibited, by the Mines Regulation Acts, 1872 (repealing prior acts), from employing any female or boy under 10 underground. Boys under 16 can only be so employed ten hours per day, and boys under 12 must attend school at certain times. No owner or worker of a mine or colliery is allowed to pay the wages of the men at any tavern, public-house, beer-shop, or place of entertainment, or any office or outhouse connected therewith. No person under 18 is to be employed at the entrance of any mine, to have charge of the steam-engine or windlass, or other machinery and tackle for letting down and bringing up the men. Inspectors are appointed by government for the express purpose of visiting mines, and seeing that the statutes are complied with. The statutes in question now apply not only to coal-mines and collieries, but to metalliferous mines of all kinds. Whenever an inspector, on examination, finds anything dangerous or defective in the mine, he is bound to give notice to the owner, so that it may be amended. In case of accidents occurring in the mine, caused by explosion,

and resulting in loss of life or bodily injury, the owner is bound, within twenty-four hours thereafter, to send notice to the Secretary of State, and to the district inspector of mines, specifying the probable cause of the accident.

**MINES**, Military, constitute at once one of the most important departments in military engineering, and a very formidable accessory both in the attack and defence of fortresses. A military mine consists of a gallery of greater or less length, run from some point of safety under an opposing work, or under an area over which an attacking force must pass, and terminating in a chamber which, being stored with gunpowder, can be exploded at the critical moment. Mines are of great use to the besiegers in the overthrow of ramparts and formation of a breach; the *countermines* of the besieged in undermining the glacis over which the assaulting column must charge, and blowing them into the air, or in destroying batteries erected for breaching, are equally serviceable. But far above the actual mischief wrought by the mine—often very great—is its moral influence on the troops, and especially on the assailants. The bravest soldiers, who advance without flinching to the very mouth of the cannon *which they see*, will hesitate to cross ground which they suppose to be undermined, and on which they may be dashed to destruction in a moment, without the power of averting the *unseen danger*. The first employment of mines was very ancient, and merely consisted in obtaining an entrance to the interior of towns by passing beneath the defences; but this soon fell into disuse, the chances of success being merely those of introducing a body of men before the besieged discovered the mine. The next use occurred during the middle ages, and was more destructive. The miners went no further than beneath the wall, then diverged to either side, and undermined the wall, say for about 100 feet. During the process, the wall was sustained by timber-props; and these being ultimately set on fire, the wall fell; and the besiegers, who had awaited the opportunity, rushed in at the breach. This use of mines of *attack* necessitated those of *defence*, which obtained in medieval times, and have ever since kept, the name of "*countermines*." The earliest subterranean defence consisted of a gallery surrounding the fort in advance of the foot of the wall, and termed an "envelope-gallery." From this the garrison would push forward small branches or tributary galleries, whence they could obtain warning of the approach of hostile miners, and by which they succeeded, at times, in overthrowing the battering-rams or towers of the besiegers.

Two centuries appear to have elapsed between the introduction of gunpowder into European warfare and its application to subterranean operations. The first instance of this occurred in 1508, at the siege of the Castello del' Uovo, in the Bay of Naples, which a French garrison had succeeded in holding for three years against the combined Spanish and Neapolitan forces. At length, a Spanish captain, Pedro Navarro, devised a gallery into the rock, which he stored with powder, whereof the explosion, hurling portions of the rock and many of the besieged into the sea, caused the immediate capture of the place. At once the use of mines of attack spread throughout Europe; and so irresistible were they soon considered, that it was not unusual for the besieger, after preparing his mine, to invite the besieged to inspect it, with the view of inducing the latter at once to surrender. Defence soon availed itself of the new power, and retaining the envelope-gallery as a base, ran small countermines in many directions, to ascertain by hearing the approach of the enemy's sappers—his work being audible, to a practised ear, at a horizontal distance of 60 feet. Small charges were then exploded, which, without creating surface disturbance, blew in the approaching gallery, and buried the sappers in its ruins. Thus commenced a system of subterranean warfare, requiring the greatest risk and courage, in which the operator was in constant danger of being suffocated. Of course, in such a system, the balance of advantage lay with the besieged, who had ample opportunities, before the siege commenced, of completing his ramifications in every direction, and, if desirable, of revetting them with masonry, which much diminished the chance of being blown in; while the assailant, no longer able to cross the glacis by an open zigzag trench, was compelled to engage in a most uncertain subterranean advance. The French engineer Belidor, in the 18th c., restored the advantage to the attack, by demonstrating that the explosion of a very large mass of powder in a mine which had not yet entered the labyrinth of defensive mines, effected the destruction of the latter for a great space round, clearing the way with certainty for the hostile advance. Although the primary purpose of a mine is the explosion of a



charge of powder, they are often used as a means of communication between different works, or between different parts of the same work, some being constructed of size sufficient to permit the passage of four men abreast, of horses, and of artillery.

It is, of course, impossible, in such a work as this, to give even an outline of the professional part of military mining; but the article would be incomplete without some allusion to the main principles.

Mines are either vertical—when they are called *shafts*—horizontal, or inclined, in either of which cases, they are “galleries,” the word “ascending” or “descending” being added, if there be inclination. The dimensions range from the “great gallery,” six feet six inches by seven feet, to the “small branch”—the last diminutive of the gallery—which has but two feet six inches height, with a breadth of two feet. The most frequent work is the “common gallery,” four feet six inches by three feet, which is considered the easiest for the miner.

The sapper's tools are numerous, but most in request are his shovel, pickaxe, and above all, his “push-pick;” he has besides a barrow, a small wagon, a lamp, and other accessories. As he advances, it is necessary to line his gallery, always at the top, and almost always at the sides. This he does either by frames—which resemble door-frames, and serve to retain horizontal planks or “sheeting” in position against the earth—or by cases somewhat resembling packing-cases, of little depth, which are used to form the sides and top. With cases, galleries are supposed to advance one foot and a half per hour; while with frames, the progress is barely more than half that amount.

When a mine is exploded, the circular opening on the surface is called the *crater*; the *line of least resistance* is the perpendicular from the charge to the surface; the half-diameter of the crater is its radius; and the *radius of explosion* is a line from the charge to the edge of the crater, on the hypotenuse of the triangle, the revolution of which would form the cone. When the diameter equals the line of least resistance, the crater is called a one-lined crater; when it doubles that line, a two-lined crater; and so on. The common mine for ordinary operations is the two-lined crater; and for this the charge of powder should—in ground of average weight and tenacity—be in pounds a number equal to one-tenth of the cube of the line of least resistance in feet; for example, at a depth of 18 feet, the charge should consist of 583 pounds. In sur-charged mines, or globes of compression, as introduced by Belidor, vastly greater charges are employed, and craters of six lines are sometimes produced. The rules, in these cases, for computing the charges vary exceedingly, according to different engineers, and in every case are very complicated. Previous to the explosion, the gallery is filled up behind the charge, or *tamped*, with earth, sand-bags, &c., to prevent the force of the powder wasting itself in the mine. This tamping must extend backwards for one and a half or twice the length of the line of least resistance. The mine is commonly fired by means of a powder-hose, composed of strong linen, enclosed in a wooden pipe laid carefully through the tamping, or by wires from a voltaic battery.

Modern engineers object to the envelope-gallery, as affording too good a base to the enemy, should he obtain possession of it; and either dispense with it altogether, or merely retain it in short sections. At suitable points among the mines, small magazines for tools and powder are formed; and at about every 80 yards, loop-holed doors of great strength are made, to stop the advance of an enemy, should he break into the galleries.

In the course of their excavations, hostile miners frequently meet, or approach within a few feet. It becomes, then, merely a question of time which shall destroy the other; shells, pistols, pikes, and petards, as well as small mines, being used with murderous effect.

Provision is made for pumping foul air out of mines; but such military works are in general badly ventilated.

**MINGHETTI**, Cavaliere Marco, a distinguished Italian writer and statesman, and for a time prime minister of Italy, was born at Bologna, on the 8th November 1818. He belonged to an opulent commercial family, and on the termination of his studies, entered on an extensive continental tour, with the object of closely investigating the political, social, and economical institutions of France, Germany, and more especially of Britain. On his return from travelling, he published his maiden

essay, inculcating the great commercial advantages of free trade, as existing in England, and espousing with warmth the economical views of Richard Cobden. In 1846, M. opened his political career by starting a journal of liberal tendencies, soon after the advent of Pius IX. to power; in 1847, he was elected member of the *Consulta delle Finanze*, and in 1848 became minister of public works. Having speedily lost faith in papal progression, M. withdrew from office, and joined the army of Charles Albert in Lombardy, where he was warmly received by the king, and appointed captain. After the battle of Goito, he was promoted major; and for his bravery in the engagement of Custoza, he received from the king the cross of the Knights of St Maurizio. On the conclusion of the war, M. resumed his study of political economy, and gained the confidence of Cavour, by whom he was consulted during the conferences of Paris. He subsequently became secretary for foreign affairs, and only resigned with Cavour on the peace of Villafranca. M. became minister of the interior in 1860, and premier in 1863. On leaving the ministry, he went as ambassador to London in 1868, and was subsequently, for a short time, minister of agriculture. In 1873 he became premier of a new ministry. His chief work is "*Della Economia pubblica e delle sue Attinenze con la morale, e Col diritto*" (1859).

**MINHO.** See **ENTRE DOURO E MINHO.**

**MINHO** (Span. *Miño*, anc. *Minius*), a river of Spain and Portugal, rises in the north-east of Galicia, in lat. about 43° 20' n., long. about 7° 15' w. Its course is south-west through the modern Spanish provinces of Lugo and Orense, after which, continuing its course, and forming the northern boundary of the Portuguese province of Minho, it falls into the Atlantic Ocean. Its length, exclusive of windings, is 180 miles, and it is navigable for small craft 28 miles above its mouth.

**MINIATURE-PAINTING**, or the painting of portraits on a small scale, originated in the practice of embellishing manuscript books. See **MANUSCRIPTS, ILLUMINATION OF**. As the initial letters were written with red lead (lat. *minium*), the art of illumination was expressed by the Low Lat. verb *miniare*, and the term *miniatura* was applied to the small pictures introduced. After the invention of printing and engraving, this delicate art entered on a new phase; copies, in small dimensions, of celebrated pictures came to be in considerable request, and, in particular, there arose such a demand for miniature portraits, that a miniature, in popular language, is held to signify "a very small portrait." Soon after their introduction, miniature-portraits were executed with very great skill in England. Holbein (b. 1498, d. 1564) painted exquisite miniatures, and having settled in London, his works had great influence in calling forth native talent. The works of Nicholas Hilliard (b. at Exeter 1547, d. 1619) are justly held in high estimation. Isaac Oliver (b. 1556, d. 1617) was employed by Queen Elizabeth and most of the distinguished characters of the time; his works are remarkable for careful and elaborate execution; and his son, Peter Oliver, achieved even a higher reputation. Thomas Flatman (b. 1633, d. 1688) painted good miniatures. Samuel Cooper (b. London 1609, d. 1672), who was, with his brother Alexander, a pupil of his uncle, Hoskins, an artist of reputation, carried miniature-painting to high excellence. Cromwell and Milton sat to him—he was employed by Charles II.—and obtained the highest patronage at the courts of France and in Holland. Till within these few years, miniature-painting continued to be successfully cultivated in Britain; but it has received a severe check since photography was invented, and most of the artists of the present time, who exercised their talents in this exquisite art, have left it for other branches of painting. As to technical details, the early artists painted on vellum, and used body-colors, that is, colors mixed with white or other opaque pigments, and this practice was continued till a comparatively late period, when thin leaves of ivory, fixed on card-board with gum, were substituted. Many of the old miniature-painters worked with oil-colors on small plates of copper or silver. After ivory was substituted for vellum, transparent colors were employed on faces, hands, and other delicate portions of the picture, the opaque colors being only used in draperies and the like; but during the present century, in which the art has been brought to the highest excellence, the practice has been to execute the entire work, with the exception of the high lights in white drapery, with transparent colors. In working, the general practice is to draw the picture very faintly and delicately with a sable hair-pencil, using a neutral tint composed of cobalt and burned

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sienna. The features are carefully made out in that way, and then the carnations, or flesh-tints, composed of pink, madder, and raw sienna, gradually introduced. The drapery and background should be freely washed in, and the whole work is then brought out by hatching, that is, by painting with lines or strokes, which the artist must accommodate to the forms, and which are diminished in size as the work progresses. Stippling, or dotting, was a method much employed, particularly in early times; but the latest masters of the art preferred hatching, and there are specimens by old masters, Perugino, for instance, executed in that manner.

MI'NIM, the name of one of the notes in modern music, the value of which is the half of a semibreve.

MINIMS (Lat. *Fratres Minimi*, Least Brethren), so called, in token of still greater humility, by contrast with the *Fratres Minores*, or Lesser Brethren of St Francis of Assisi (q. v.), an order of the Roman Catholic Church, founded by another St Francis, a native of Paula, a small town of Calabria, about the middle of the 15th century. Francis had, as a boy, entered the Franciscan order; but the austerities of that rule failed to satisfy his ardor, and on his return from a pilgrimage to Rome and Assisi, he founded, in 1453, an association of Hermits of St Francis, who first lived in separate cells, but eventually were united in the conventual life in 1474, and established in several places in Calabria and Sicily. Francis was also invited into France by Louis XI., and founded houses of his order at Amboise and at Plessis-les-Tours. In Spain, the brethren took the name of "Fathers of Victory," in memory of the recovery of Malaga from the Moors, which was ascribed to their prayers. It was not till very near the close of the life of Francis that he drew up the rule of his order. It is exceedingly austere, the brethren being debarred the use not only of meat, but of eggs, butter, cheese, and milk. Notwithstanding its severity, this institute attained considerable success; its houses, soon after the death of Francis (1502), numbering no fewer than 450. It has reckoned several distinguished scholars among its members; but in latter times, the order has fallen into decay, being now limited to a few houses in Italy, the chief of which is at Rome. The superiors of convents in this order are called by the curious name of *Corrector*, the general being styled *Generalis Corrector*. A corresponding order of females had its origin about the same time, but this order also has fallen into disuse.

MINING is a general term for the underground operations by which the various metals and other minerals are procured. It has been practised to some extent from the remotest times, as is proved by the reference to it in the 28th chapter of the book of Job. In its proper sense, the art was certainly known to the ancient Phœnicians and Egyptians, and also to the Greeks and Romans. Mining operations were carried on in Britain by the latter at the time of the Roman Conquest. After the Norman Conquest, Jews, and, at a later time, Germans were largely employed in our mines. The introduction of gunpowder as a blasting material in 1620, led the way to many improvements in mining; so also did the introduction of powerful engines for pumping water, about the beginning of the 18th c.

There are two principal methods of mining: one of which is adopted where the mineral occurs in veins or lodes, as copper and lead ore; and the other where the mineral occurs in more or less parallel beds, as coal. Mining in alluvial deposits is a third method, largely practised in the gold regions of California and Australia, and includes the novel process of "hydraulic mining."

In mines like those of Cornwall and Devonshire, where most of the copper and tin of Great Britain, and also some of the lead, are obtained, the ores occur in veins filling cracks or fissures in the rocks. Such veins are termed lodes, to distinguish them from veins of quartz and other non-metallic minerals. Lodes are very irregular in size, and in the directions they take, though they usually follow one general line.

Mineral veins sometimes extend for several miles through a country; but they expand and contract so much, and split up into so many branches, that it is perhaps uncertain whether the same lode has ever been traced for more than a mile. Veins seldom deviate more than 45 degrees from a perpendicular line, and descend to unknown depths. They penetrate alike stratified and unstratified rocks. Those veins which run east and west have been observed to be the most productive.

The adit, or day-level, is a long passage to which the water of the mine is pumped

up and conveyed away. Some adits are made to traverse several mines. The great adit which drains the mines of Glengap and Redruth, in Cornwall, is 30 miles long.

Levels are generally about ten fathoms (60 feet) apart. They are rarely perpendicular above each other, as they follow the inclination of the vein. In the section, the richer portions of the lode, termed "bunches," are shewn shaded; and where these have been removed, and their place filled with rubbish, angular fragments are represented. This is necessary to prevent the slides of workings from falling in. The bottom of the engine shaft is the lowest portion of the mine. It is called the *sump*, and is the place where the water from the various levels and workings collects, in order to be pumped up to the adit. The galleries and shafts in an extensive mine are very numerous, making it altogether a very complicated affair. The shafts, however, have all distinct names, and the levels are known by their depth in fathoms, so that particular places are as easily found as streets in a town. The underground workings of the Consolidated Mines, which are the largest in Cornwall, being a conjunction of four mines, are 55,000 fathoms, or 63 miles, in extent. In working out the lode between one level and another, the miner usually goes upwards, it being easier to throw down the ore than to raise it up. He works with the light of a candle, stuck with clay to the side of the mine. His tools are few—namely, a pick, a hammer, and some wedges where the vein is soft and friable; but it is generally hard enough to require blasting, in which case he uses a *borer* or *jumper*, and some smaller tools for cleaning and stemming the hole which is made. The ore is filled into wagons, and then drawn along the gallery to the shaft, to be raised to the surface in *kibbles*.

A vein may be 30 or 40 feet thick, and so poor in ore as not to be worth working; again, it may be only a few inches thick, and yet its richness may amply repay the labor of extracting it. Three or four feet may be taken as the average of several kinds of veins. In extensive mines, portions of the ore are here and there left in the lode, so as to furnish a steady supply when other parts are unproductive. These are called *eyes*, and when they are afterwards removed, the operation is termed *picking out the eyes of the mine*.

The old plan of ascending and descending the mines by ladders, so destructive to the health of the miners, is still largely in use. The ladders are now about 25 feet long, and set with a slope. There is a platform at the bottom of each called a *sollar*, with a man-hole in it leading to the next ladder beneath. Some of the Cornish mines are half a mile deep, so that it takes the miner an hour to reach the surface after he is done with his work; most of the journey being accomplished on wet, slippery ladders. The bad effects of the fatigue so produced is augmented by the fact that the men come from a constant temperature of 80° or 90° F. below, to one of perhaps 30° or 40° on the surface. Dr J. B. Sanderson states as the result of recent inquiries, that 90° F. is the highest limit of temperature consistent with healthy labor in a mine.

A great improvement on the ladder system is now in operation in several of the deep Cornish mines. It is a method first introduced into the deep mines of the Harz, and called the *Fuhr-kunst*. The plan of this "man-engine" is this. Two rods descend through the depth of the shaft, and upon these bracket-steps are fixed every 12 feet. The rods move up and down alternately through this distance by means of a reciprocating motion.

Some of the Cornish pumping-engines are very large and powerful. The cylinder of one of the largest is 7 feet 6 inches in diameter. With the expenditure of one bushel of coal, it can raise 100,000,000 lbs. weight one foot high; this is called its "duty." It lifts nearly 800 gallons of water per minute, and its cost was about £8000.

In Cornwall, the miners are divided into two classes; one of them called *tributers*, who take a two months' contract of a portion of the lode; the other called *intmen*, who are employed in sinking shafts, driving levels, &c.

A detailed analysis of one of the largest Cornish copper mines, published some years ago, shews that in that year it produced, in round numbers, 16,000 tons of ore, realising £90,000, and yielding a net profit of about £16,000. It employed about 700 miners, 300 laborers, 200 boys, and 300 women and girls. The cost for coal was £1800; for malleable iron and steel, £1300; for foundry castings, £2000; for ropes, £1000; for caudles, £1800; for gunpowder, £2000; and for timber, nearly £3000.

The last Mines Regulation Acts were passed in 1872 (amended in 1875). See MINES IN LAW.

*Mining for Coal.*—The minerals of the carboniferous formation, at least those which occur in beds or strata, as coal and clay ironstone, are mined, as has been already said, in a different way from metallic veins. Originally deposited in a horizontal position, they have been so altered by movements in the earth's crust, that they are rarely found so now. They are more generally found lying in a kind of basin or trough, with many minor undulations and dislocations. But however much twisted out of their original position, the different seams, more or less, preserve their parallelism, a fact of great service to the miner, since beds of shale, or other minerals, of a known distance from a coal seam, are often exposed when the coal itself is not, and so indicate where it may be found.

The great progress made of late years in the science of geology has made us so minutely acquainted with all the rock formations above and below the coal-measures, that it is now a comparatively easy matter to determine whether, in any given spot, coal may or may not be found. Nevertheless, large sums are still occasionally, as they have in past times been very frequently, wasted in the fruitless search for coal, where the character of the rocks indicates formations far removed from coal-bearing strata.

When there are good grounds for supposing that coal is likely to be found in any particular locality, before a pit is sunk, the preliminary process of "Boring" (q. v.) is resorted to, in order to determine whether it actually does exist there, and if in quantity sufficient to make the mining of it profitable. The usual mode of "winning" or reaching the coal is to sink a perpendicular shaft, but sometimes a level or cross-cut mine, and at other times, an inclined plane or "dook" is adopted. Before the introduction of pumping-engines, all coal-workings were drained by means of a level mine called a *day-level*, driven from the lowest available point on the surface, and no coal could be wrought at a lower depth than this, because there were no means of removing the water.

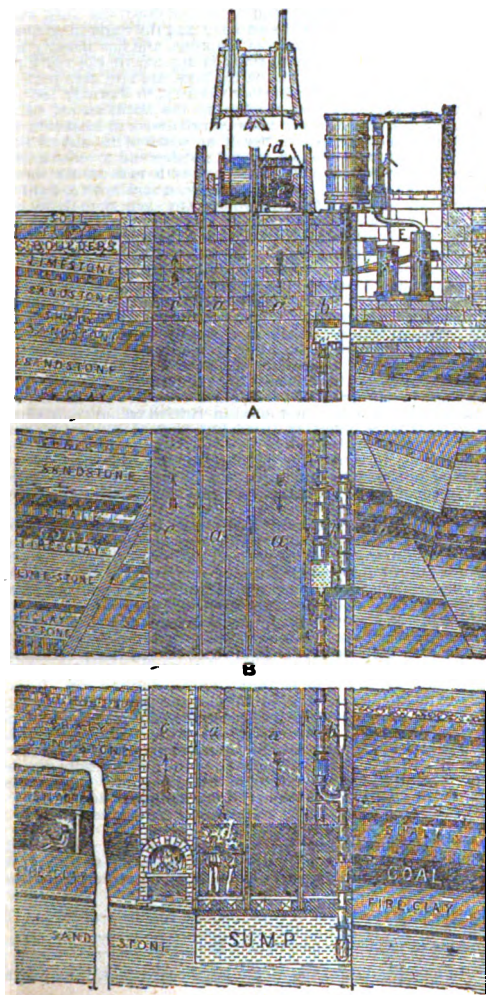
When the shaft has been sunk to the necessary depth, a level passage, called the *dip-head*, or *main-level*, is first driven on each side, which acts as a roadway or passage, and, at the same time, as a drain to conduct the water, which accumulates in the workings, by means of a gutter on one side, to the lodgment at the bottom of the shaft. This level is the lowest limit of the workings in the direction of the dip, and from it the coal is worked out as far as is practicable along the rise of the strata. There are two principal methods of mining the coal. One is termed the "post-and-stall" or "stoop-and-room" system, and is used for thick seams; the other is called the "long-wall" system, and is adopted for seams under four feet in thickness.

The *long-wall* system consists in extracting the entire seam of coal at the first working, the overlying strata being supported by the waste rock from the roof of the workings. It is necessary, however, to leave large stoops at the bottom of the shaft for its support, as in the stoop-and-room method. In long-wall workings, roads of a proper height and width require to be made for communication with the different parts of the mine.

The collier's usual mode of extracting the coal from its bed is this: With a light pick, he undercuts the coal-seam, technically termed "holing," for two or three feet inwards, and then, by driving in wedges at the top of the seam, he breaks away the portion which has been holed. Blasting is occasionally, but not often resorted to. For the past ten years, machines, some for "holing" only, and others for both "holing" and hewing down coal-seams, have been more or less in use. They usually work with compressed air, but sometimes with steam or water. It is still premature, however, to express any decided opinion as to their efficiency as compared with hand-labor. The coal, when separated from its bed, is put on tubs or hutches, which are generally drawn by horses, but sometimes by engine-power, along the roads to the bottom of the shaft, and hoisted to the surface.

The shaft is perhaps the most important portion of a coal-pit, and the principal parts of one are shown in the figure. The upper part shows the pit-head arrangements, the central part shows the force-pump, &c., and the lower part shows the pit-bottom arrangements. To make the section complete, the reader must imagine a great depth to intervene at the gaps A and B. There are four divisions in this shaft: the

Vertical Section of the Shaft of a Coal-pit, with a Detached Portion, shewing a Miner at work on the Coal Beam.



two centre ones, *a, a*, are used for sending up and down the men and the coal; the one on the right side, *b*, contains the pumps; and the remaining one on the left, *c*, is for withdrawing the vitiated air from the mine, and has usually a furnace at the bottom of it. In some pits a special shaft is applied to the ventilation, for which mechanical contrivances, such as ventilating fans, are now also partially introduced. Since the dreadful accident at the Hartley Colliery, in January 1862, caused by the beam of the engine breaking and closing up the shaft, an act of parliament has been passed making it imperative to have two shafts, or at least two outlets, to every coal-mine, as a means of escape, in case of an accident to one of them.

The cages *d, d*, by which the colliers ascend and descend, are also used for raising the coal. They are merely square plats of timber, with rails across them, for the convenience of running off and on the coal-hutches, *e*, and with a light iron frame, by which they are suspended to a flat wire-rope. On each cage there are iron clasps, which slide up and down on guide-rods. In the figure, two miners are shewn standing on one cage at the bottom of the shaft, and the other is at the top, with a coal-hutch upon it. The accidents resulting from the raising and lowering of the cages are numerous; many of them happen by the carelessness of the engine-man in not stopping the cage when it reaches the mouth of the pit, and so allowing it to be upset by over-winding. Many accidents also happen from the rope breaking. To prevent this, numerous "safety-cages" have been invented, most of which depend on the action of a spring, which is held in a certain position while the cage is suspended by the rope; but should the latter snap, the spring is suddenly relieved, and then grasping the guide-rods, prevents the cage from falling. Other safety-cages act by levers and clutches, but it is still disputed whether there is, on the whole, a decided advantage in using any of them, since they are all liable to get out of order. The man-engine, although not used in British collieries, is adopted in several on the continent, and is certainly the safest way of putting up and down men in a pit.

The steam-engine, *R*, works the pumps, in this case by a direct action, the pump-rods being attached to the piston-rod. The engine also winds up the cages, one of which ascends while the other descends—the barrel and other arrangements for which are shewn in the figure.

The proper ventilation of any mine, but especially of a coal-mine, is of very great importance. It clears the mine of the dangerous gases, fire-damp and foul-damp, dries the subterranean roadways, and furnishes the miners with a supply of pure air. Some idea of the general mode of ventilating a mine will be obtained by referring to the figure, where the arrows pointing downwards indicate the *downcast* shaft, and the arrows pointing upwards, the *upcast* one; and to the plan, where the atmospheric air, entering by the downcast shaft, passes along the roadways, as indicated by arrows. A number of doors and stops secure the travelling of the current in a proper direction, so as to reach the furthest recesses of the mine. It then returns by the upcast shaft, where, as has been already stated, it is usual to keep a furnace burning, to aid in withdrawing the impure air. It is very difficult, however, to secure efficient ventilation through all the zigzag windings of a mine; hence the frequent, and sometimes terrible explosions of fire-damp, or light carburetted hydrogen, which explodes when mixed with a certain proportion of atmospheric air; hence, also, the occasional accumulation of foul-damp (carbonic acid) in some pits, which suffocates any one breathing it. This deadly gas is always produced in large quantity by an explosion of fire-damp, and chokes many who have survived the violence of the explosion. Many collieries are so free of fire-damp, that the miners work with naked lights, but in others it is necessary to use the Safety Lamp (q. v.).

Besides the already mentioned sources of accident, there is the sudden falling-in of pieces from the roof of the workings. The following summary, made up from H.M. Inspector's returns, shews the number of lives lost, in proportion to the quantity of coal raised:

Total tons of mineral raised in Great Britain for the year 1876.....	148,969,365
Total number of lives lost in 1876.....	933
Average tons of mineral raised to each life lost.....	159,688

To shew the magnitude of some of the large coal-mines, it may be stated that the

Hetton Colliery, in Durham, yields 800,000 tons in the year, employs about 1000 men and 300 boys underground, and 300 people at the surface. The Monkwearmouth pit, near Newcastle, is 1900 feet deep, and its face-workings are two miles from the bottom of the shaft. Rosebridge Colliery, near Wigan, has the deepest shaft in England, being nearly 2500 feet deep. The sinking of some of the more difficult shafts has cost from £50,600 to £100,000 each.

**MINISTER**, a public functionary who has the chief direction of any department in a state. See **MINISTRY**. Also the delegate or representative of a sovereign at a foreign court to treat of affairs of state. Every independent state has a right to send public ministers to, and receive them from, any other sovereign state with which it desires to preserve relations of amity. Semi-sovereign states have generally been considered not to possess the *jus legationis*, unless when delegated to them by the state on which they are dependent. The right of confederated states to send public ministers to each other, or to foreign states, depends on the nature and constitution of the union by which they are bound together. The constitution of the United Provinces of the Low Countries and of the old German Empire preserved this right to the individual states or princes, as do the present constitutions of the German Empire and Swiss Confederation. The constitution of the United States either greatly modifies or entirely takes away the *jus legationis* of each individual state. Every sovereign state has a right to receive public ministers from other powers, unless where obligations to the contrary have been entered into by treaty. The diplomatic usage of Europe recognises three orders of ministers. Ministers of the first order possess the representative character in the highest degree, representing the state or sovereign sending them not only in the particular affairs with which they are charged, but in other matters: they may claim the same honors as would belong to their constituent, if present. This first class of diplomatic agents includes papal legates and nuncios, and ambassadors ordinary and extraordinary. A principle of reciprocity is recognised in the class of diplomatic agents sent. States enjoying the honors of royalty send to each other ministers of the first class; so also in some cases do those states which do not enjoy them; but it is said that no state enjoying such honors can receive ministers of the first class from those who are not possessed of them.

Ministers of the second and third order have not the same strictly representative character; their representation is not held to go beyond the affairs with which they are charged. They are, however, the natural protectors of the subjects of the state or country sending them in the country to which they are sent. Ministers of the second class include envoys, whether these are simply so styled, or denominated envoys extraordinary, and also ministers plenipotentiary. The third class of ministers does not differ from the second in the degree of their representative character, but only in the diversity of their dignity, and the ceremonial with which they are received. This class comprehends ministers, ministers resident, ministers chargés d'affaires, such consuls as are possessed of a diplomatic character, and those chargés d'affaires who are sent to courts to which it is not wished to send agents with the title of minister. Ministers of the third class have, for the most part, no letters-credencial from the sovereign, and are accredited only by letters to the foreign minister or secretary of the country to which they are sent.

Besides these orders of ministers, there are other diplomatic agents occasionally recognised—as deputies sent to a congress or confederacy of states, and commissioners sent to settle territorial limits or disputes concerning jurisdiction. These are generally considered to enjoy the privileges of ministers of the second and third order. Ministers-mediators are ministers sent by two powers, between which a dispute has arisen, to a foreign court or congress, where a third power, or several powers, have, with the consent of the two powers at variance, offered to mediate between them.

Diplomatic agents, except as already mentioned, those of the third class, are accredited by a letter to the sovereign of the country to which they are sent. The letter of credence is usually despatched under a *cachet volant*—i. e., a seal which does not close the letter; or else, in addition to the principal letter, an authenticated copy is sent, which the diplomatic agent on his arrival presents to the Minister or Secretary for Foreign Affairs, as his right to demand an audience of the sovereign; the original is presented to the sovereign. Ministers sent to a congress or diet have usually no credentials, but merely a full power, of which an authenticated



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copy is delivered into the hands of a directing minister, or minister-mediator. A minister of the first class is received to both public and private audiences by the sovereign to whom he is accredited; a minister of the second class generally to private audiences only. Diplomatic agents are entitled to conduct negotiations either directly with the sovereign, or with the minister or secretary for foreign affairs. The latter course is the more usual, and generally the more convenient.

The title "Excellency" has, since the peace of Westphalia, been accorded to all diplomatic agents of the first class; and in some courts it is extended to ministers of the second class, or at least to those sent by the great powers. See **AMBASSADOR**, **ENVoy**, **CONSUL**. Under **AMBASSADOR**, the immunities and privileges enjoyed by diplomatic agents are explained.

**MINISTRY**, the body of ministers of state, or persons to whom the sovereign or chief magistrate of a country commits the executive government.

It is a principle of the constitution of Great Britain, that "the king can do no wrong;" that is to say, the sovereign personally is irresponsible for his acts, the real responsibility resting with the administrative government. The "King's Council," or **PRIVY COUNCIL**, were the earliest advisers of the sovereign in matters of state; but when this body came, in course of time, to be found too large for the dispatch of business, its duties were transferred to a small committee of privy councillors selected by the king. As late as in Charles I.'s time, all the more important resolutions of the crown were taken after deliberation and assent of the Privy Council. An unsuccessful attempt was made in the reign of Charles II. to restore the council to its original functions. Its numbers were limited to thirty; and it was intended that this limited council should have the control of the whole executive administration, superseding any interior cabinet. But the council was found too extensive for an effectively working ministry, and the former arrangement was restored. The **CABINET** or **MINISTRY** is now but a committee of the Privy Council; and its exclusive right to discuss and determine the plans and business of the government has been often said not to be recognised by the law, a position which, however, was disputed by Lord Campbell, who maintained that, "by our constitution, it is in practice a defined and acknowledged body for carrying on the executive government of the country." Proclamations and orders still issue from the Privy Council; and it is occasionally assembled to deliberate on public affairs, when only those councillors who are summoned attend. The cabinet is a merely deliberative body; its members collectively have no power to issue warrants or proclamations; but all important measures which engage the attention of the government, whether regarding matters domestic, foreign, or colonial, and all plans of action, whether purely administrative, or to be carried out in parliament, must be proposed, considered, and adopted by the cabinet. The sovereign intrusts the formation of a ministry to a statesman, who selects for the members of his cabinet those who are attached to his political views. He generally places himself at the head of the government as First Lord of the Treasury, and in popular language, he is called the Premier, or Prime Minister. The Lord Chancellor, the Chancellor of the Exchequer, the Secretaries of State for Home, Foreign, Colonial, and Indian affairs, the Secretary at War, and the President of the Council, are necessarily members of the cabinet; and with them are associated the heads of various other important departments of government, including generally the First Lord of the Admiralty, the President of the Board of Trade, the Postmaster-general, the President of the Poor-law Board, the Chancellor of the Duchy of Lancaster, and occasionally the Chief Secretary for Ireland. The Premier has sometimes held the office of Chancellor of the Exchequer in conjunction with that of First Lord of the Treasury. A privy councillor of great political weight is sometimes called into the cabinet without office, and takes the post of Lord Privy Seal. Her Majesty's ministers include the following, who have usually no seat in the cabinet: the Chief Secretary for Ireland, the First Commissioner of Works, the Vice-president of the Board of Trade, the Vice-president of the Committee on Education, the Commander-in-chief, the Lord Chamberlain, the Steward, the Master of the Horse, the Master of the Buckhounds, the Comptroller of the Household, the Lord Lieutenant of Ireland, the Attorney-general and Solicitor-general of England, the Lord Advocate and Solicitor-general of Scotland, and the Attorney-general and Solicitor-general of Ireland. Occasionally, but exceptionally, the Commander-in-chief, and the Lord Chief Justice of England, have

been members of the cabinet. A ministry is often spoken of as the ministry of the person who is at its head.

Meetings of the cabinet are held on the summons of any one of its members, usually at the Foreign Office. Its proceedings are secret and confidential, and no record is kept of its resolutions, which are carried into effect by those of its members to whose departments they severally belong. As the acts of a ministry are at all times liable to be called in question in parliament, it is necessary that the heads of the chief departments should have seats in either House, in order to be able, when required, to give prompt explanations.

A government exists only so long as it can command the confidence of parliament. The sovereign has the power to dismiss his ministers whenever they cease to possess his confidence, but such a change would be useless without the support of the House of Commons, who, by withholding their support, could paralyse all the functions of government. A sovereign has sometimes got rid of a ministry with whose policy he was dissatisfied, by dissolving parliament, and appealing to the country. Where a ministry cannot command the confidence of parliament, they resign, and a statesman of some other political party is sent for by the sovereign, and authorised to form a new cabinet. All the adherents of a ministry filling political offices resign along with it, as also the great officers of the court, and those officers of the royal household who have seats in either house of parliament. Sometimes officers holding lucrative appointments which do not necessitate resignation, have retired, as a manifestation of adherence to their political friends. In addition to the ministers already named, the following adherents of the ministry go out of office on a change of government: the three junior Lords of the Treasury, the two Secretaries of the Treasury, the four parliamentary Under-secretaries of State, the Paymaster-general, the Master-general of the Ordnance, the Surveyor-general of the Ordnance, the five junior Lords of the Admiralty, the first Secretary of the Admiralty, the Chief Commissioner of Greenwich Hospital, the President and Parliamentary Secretary of the Poor-law Board, the President of the Board of Health, the Vice-chamberlain, the Captain of the Gentlemen-at-arms, the Captain of the Yeomen of the Guard, the Lords in Waiting, the Mistress of the Robes, the Treasurer of the Household, the Chief Equerry, or Clerk Marshal, the Judge Advocate-general, and the Lord Chancellor for Ireland. The private secretary to a minister loses office on a change, his appointment being a purely personal one; and some changes are generally, though not always made in ambassadors extraordinary.

In 1839, when Viscount Melbourne's ministry resigned, Sir Robert Peel, who was intrusted by the Queen with the formation of a new ministry, proposed that, in order to give public proof of her Majesty's confidence, the change should include the chief appointments held by the ladies of her Majesty's household. The Queen, counselled by Lord Melbourne, refused her consent to this proposal, on the ground of its being contrary to the latest precedents of the reign of Queen Anne. Sir Robert, however (with whose opinion the Duke of Wellington expressed concurrence), considered the change a necessary one; and as he refused to undertake the formation of a government without its being adopted, the result was that Lord Melbourne and his colleagues were reinstated. At a council held on their resuming office, it was resolved, "That for the purpose of giving to the administration the character of efficiency and stability, and those marks of the constitutional support of the crown that are requisite to enable it to act usefully to the public service, it is reasonable that the great officers of the court, and situations in the household held by members of parliament, should be included in the political arrangements made in a change of the administration. But they are not of opinion that a similar principle should be applied or extended to the offices held by ladies in her Majesty's household."

**MINIUM** (Lat. red-lead). See **LEAD**.

**MINK** (*Mustela lutreola*), a species of weasel, inhabiting the northern parts of Europe and Asia; very similar to which in characters and habits is another species, by some regarded as only a variety of the same, the *M. or* *Vison* (*M. vison*) of North America, abundant in almost every part of that continent. Both inhabit the neighborhood of streams, lakes, and marshes; have semi-palmated feet, are expert swimmers and divers, and prey on fishes, frogs, and other aquatic animals, as well as on birds, rats, mice, &c. They are covered with a downy fur, interspersed with longer

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**Minor**

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and stronger hairs: the color is brown, with more or less of white on the under parts. The American *M.* is generally larger than that of the Old World, being often more than eighteen inches from the nose to the root of the tail, whilst the latter is seldom more than twelve. It has also a more bushy tail. It is very active and bold, and often commits great depredations in poultry-yards, carrying off a fowl with great ease. Unlike most of its congeners, it is easily tamed, and becomes much attached to those who caress it. In domestication, it ceases to regard the inmates of the poultry-yard as prey. It emits an unpleasant odor only when irritated or alarmed. The fur of the *M.* is valuable.

**MINNESINGERS**, a designation applied to the earliest lyric poets of Germany in the 12th and 13th centuries, and derived from the word *Minne*, or love, which was at first the predominating, and almost sole subject treated of in their productions. The works of the *M.* are for the most part superior to those of their more generally known contemporaries, the troubadours, both in regard to delicacy of sentiment, elegance and variety of rhythmical structure, and grace of diction. Henry of Vel-dig, who flourished in the beginning of the 12th c. at the court of the Swabian, Frederick Barbarossa, Emperor of Germany, is regarded as the father of the *M.*, and Walther von der Weide, who was born about 1170, as the last of this great vocal band, which included emperors, princes, nobles, and knights. Many of their productions have of course perished, although, in addition to a very large collection of poems by anonymous *M.*, we still possess some remains of the songs of more than 150 known composers. Among the most celebrated of these, special notice is due to Wolfram von Eschenbach (q. v.), Henry von Ofterdingen, Hagenaue, Hartmann von der Aue (q. v.), Gottfried von Strassburg (q. v.), Otto von Botenlauben, Truchsees von St Gall, and Ulrich von Lichtenstein—men of noble houses, who, although they belonged to every part of Germany, wrote almost exclusively in the Swabian dialect, which, during the brilliant days of the Fredericks and Conrads of the House of Swabia, was the language of the court in Germany. Among the few other forms of German employed by the *M.*, the one next in favor was the Thuringian, adopted in compliment to Hermann, Landgraf of Thuringia, who, next to the princes of the Swabian dynasty, was the most munificent patron of the *M.* during the period of their renown, in the early part of the 13th century. Besides songs in praise of women, the *M.* composed odes on public or private occasions of lament or joy, distiches or axioms, and "Wachtlieder," or watch-songs, in which the lover was represented as expostulating with the watchman, who kept guard at the gate of the castle within which his lady-love was imprisoned, and trying to persuade him to grant him admittance to her presence. These songs and odes were recited by the composer, to his own accompaniment on the viol; and as few of the *M.* could write, their compositions were preserved mostly by verbal tradition only, and carried by wandering minstrels from castle to castle throughout Germany, and even beyond its borders. As the variety of rhythm and complicated forms of versification affected by the *M.*, more especially towards the decline of their art, rendered it difficult to retain by memory the mass of Minnesong which had been gradually accumulated, these itinerant musicians finally made use of written collections, a practice to which alone we are indebted for the many beautiful specimens of early German lyrical poetry which we yet possess. The glory of the *M.* may be said to have perished with the downfall of the Swabian dynasty, under which greater liberty of thought and word was allowed among Germans than they again enjoyed for many ages; and in proportion as the church succeeded in re-asserting its sway over the minds of men, which it had lost under the rule of the chivalric Fredericks, freedom of speech and action was trammelled, and song and poetry condemned. Paraphrases of Scripture, hymns, and monkish legends, took the place of the chivalric songs of the nobly born *M.*, and German poetry was for a time almost annihilated.

In the 14th c., the art of Minnesong was partially revived, although under a rude and clumsily elaborated form, by the *Meister-singers*, a body of men belonging to the burgher and peasant classes, who, in accordance with their artisan habits, formed themselves into guilds or companies, which bound themselves to observe certain arbitrary laws of rhythm. Nuremberg was the focus of their guilds, which rapidly spread over the whole of Germany, and gained so firm a footing in the land, that the last of them was not dissolved at Ulm till 1839. As the title of Master was only

awarded to a member who invented a new form of verse, and the companies consisted almost exclusively of uneducated persons of the working-classes, it may easily be conceived that extravagances and absurdities of every kind speedily formed a leading characteristic of their modes of versification; attention to quantity was, moreover, not deemed necessary, regard being had merely to the number of the syllables, and the relative position and order of the verses and rhymes. Their songs were lyrical, and sung to music; and although, as before remarked, each master was bound to devise a special *stols* or order of rhymes for each of his compositions, these *stols* were subjected to a severe code of criticism, enacted by the *Tabulatur*, or rules of the song-schools. Among the few Masters who exhibited any genuine poetic feeling, the most noted were Heinrich Mügelin, Michael Behalm, and the Nuremberg shoemaker, Hans Sachs, who prided himself on having composed 4275 "Bar" or Master Songs. See Tieck's "Minnelieder" (1803); Taylor's "Lays of the Minne and Master Singers" (Lond. 1825); and Von der Hagen's "Minnesänger" (4 vols. 1838).

**MINNESO'TA**, one of the United States of America, lies in lat.  $43^{\circ} 30'$ — $49^{\circ}$  n., and long.  $89^{\circ} 29'$ — $97^{\circ} 5'$  w. It is 380 miles in extreme length from north to south, and from 183 to 337 from east to west, containing an area of 88,531 square miles. It is bounded on the n. by the British possessions, from which it is separated by the chain of lakes and rivers connecting the Lake of the Woods with Lake Superior, and by the 49th parallel of latitude; e. by Lake Superior and Wisconsin; s. by Iowa; and w. by Dakota Territory (q. v.), from which it is partly divided by the Red River of the North. It contains 75 counties, and its chief towns are St Paul, the capital, Red Wing, Winona, Hastings, Minneapolis, &c. M. contains the summit of the central table-land of the North American continent, where, within a few miles of each other, are the sources of rivers which find their outlets in Hudson's Bay, the Gulf of St Lawrence, and the Gulf of Mexico. The state is abundantly watered by the Mississippi, Minnesota, Red River of the North, Rainy Lake River, and their branches, and has more than 1500 miles of navigable rivers. The country abounds also in lakes and ponds. The sources of the great rivers are 1680 feet above the level of the sea. Though the most northerly state in the Union, M. is one of the most beautiful, fertile, and salubrious. The winters are long and cold, but equable, and the country is rich in fertile lands and forests. The clear waters are stored with fish, and game is abundant. The scenery is varied and beautiful. The Falls of St Anthony on the Mississippi afford abundant water-power. Near these is the beautiful cascade of the Minnehaha, or Laughing Water, 45 feet perpendicular, and a cavern, explored to the depth of 1000 feet. M. began to be settled in 1845, though it was explored by the French, and trading-posts established, in 1680. The chief route to the British settlements of the Red River of the North lies through Minnesota. The state has plenty of good timber, and is rich in minerals, including gold, iron, copper, coal, and lead. In 1870, its agricultural products were valued at \$53,446,400. In the same year it had 6 universities and colleges, and 2424 public schools. In January 1875, 1940 miles of railway were completed, and about 1000 more projected, towards which grants of land have been made to the extent of nearly \$4,500,000. Powerful Indian tribes occupy portions of the state. The state government was organised in 1858. Pop. in 1860, 172,023; in 1880, 780,773.

**MINNESOTA**, or St Peter's River, rises near the eastern boundary of Dakota Territory, United States of America, runs south-east 800 miles, to South Bend, then north-east 120 miles, and falls into the Mississippi at Mendota. It is navigable for 40 miles by steam-boats.

**MINNOW** (*Leuciscus phoxinus*), a small fish of the same genus with the roach, dace, chub, &c., of a more rounded form than most of its congeners, a common native of streams with gravelly bottoms in most parts of Britain. It seldom exceeds three inches in length, the head and back of a dusky olive color, the sides lighter and mottled, the belly white, or, in summer, pink. Minnows swim in shoals, feed readily either on animal or vegetable substances, if sufficiently soft, and are said to be very destructive to the spawn of salmon and of trout. Very young anglers generally begin their sport by catching minnow. The M. is a fish of very pleasant flavor. A casting-net affords the means of taking it in sufficient abundance. It is a favorite bait for pike and large trout or perch.

**MINOR**, a term in Music. 1. In the nomenclature of intervals. The interval

between any note and another is named according to the number of degrees between them on the scale, both notes included. The interval between C and E is called a third; that between E and G is also a third; but these intervals are unequal, the one consisting of four semitones, the other of three; the former is therefore distinguished as a major, the latter as a minor interval. 2. The term is also applied to one of the two modes in which a musical passage may be composed. The scale of the minor mode differs from that of the major mode in the third of its key-note being a minor instead of a major third. See MUSIC, MODE.

MINOR is, in Scotch Law, the term describing a person who, if a male, is between the ages of 14 and 21; and if a female, is between 12 and 21. In the preceding period, he or she is called a Pupil. In England, the technical term is an Infant (q. v.), which includes all persons, male and female, under the age of 21. In Scotland, a minor is for many purposes *sui juris*, and can marry without anybody's consent, and can also make a will of movable property. For the purpose, however, of managing his real property and making contracts, curators are often necessary. See INFANT, RESTITUTION, GUARDIAN.

MINOR BARONS. The word baron, in the earliest period of feudalism, signified one who held lands of a superior by military tenure. The superior might be the sovereign, or he might be an earl or other eminent person, who held of the sovereign. According as he was the one or the other, the baron was, in the earliest sense of the distinction, a greater or lesser baron. At the Conquest, a large part of the soil of England was parcelled by William the Norman among his military retainers, who were bound in return to perform services, to do homage, and to assist in administering justice, and in transacting the other business done in the court of the king. 400 of these tenants-in-chief of the crown are enumerated in Domesday (q. v.), including among them "vicecomites" and "conites," who together constituted the body of men called the Barons of England. As the sovereign was entitled to demand from the barons military service, homage, and attendance in the courts, so, many of the principal barons, particularly such of them as were earls, had military tenants, from whom they in turn received homage and assistance in administering justice in their baronial courts. These tenants were barons of the barons, or, in the earliest sense, minor barons; but by the usage of England, from the Conquest downwards, they were seldom called barons, that term having been generally restricted to the former class, the holders of land direct from the crown, who were next to the king in dignity, formed his army and his legislative assembly, and obtained the Great Charter from King John. The subinfeudation which produced the minor barons was checked by a statute of Edward I., directing that all persons acquiring lands from a subject should hold, not of that subject, but of his superior.

Out of the "commune concilium" of the king, at which all his barons were bound to attend, arose the parliament. It is not till the close of Henry III.'s, or beginning of Edward I.'s reign that we find a select number instead of the whole barons attending. The exact period of the change, and the way in which it was made, are still among the obscure points of English history; it has been thought that after the rebellion which was crushed at the battle of Evesham, Henry III. summoned only those barons who were most devoted to his interest. From this period, a new distinction between major and minor barons arose, the latter term being no longer applied to the barons of the barons, but to those barons of the crown who were no longer summoned by writ to parliament. The word baron was more and more used in the restricted sense of a baron of parliament, and the right or duty of attendance came in process of time to be founded, not on the tenure, but on the writ.

In Scotland, the barons (or lords) were such persons as held their lands directly of the crown. They were the king's advisers, witnessed his charters, and possessed a civil and criminal jurisdiction. All had to give attendance in the Scottish parliament, which consisted of the earls and barons sitting together. After the reign of James I., some of the more powerful barons appear more exclusively as lords of parliament, those whose incomes were below a certain amount obtaining a dispensation from attendance; yet all possessed a right to attend parliament till 1587, when the barons not specially created lords of parliament were required, in place of personally attending, to send representatives of their order from each sheriffdom. The term baron, however, still continued in Scotland to be applied to the whole body of tenants

as *capite*, such of them as were lords of parliament being distinctively major, and the others minor barons; but all continuing up to 1747 to possess an extensive civil jurisdiction, and a criminal jurisdiction, from which only treason and the four pleas of the crown were excluded. The representative minor barons sat in the same House with the major barons, and their votes continued down to the union to be recorded as those of the "Small Barrounia."

**MINORCA**, the largest of the Balearic Isles (q. v.), after Majorca, from which it is distant 25 miles north-east. It is 81 miles long, and 15 miles in greatest breadth, with an area of about 300 square miles. Pop. 37,262. Its coast, broken into numerous bays and inlets, is fringed with islets and shoals, and its surface, less mountainous than that of Majorca, is undulating, rising to its highest point in Mount Toro, 4793 feet above sea-level. Its productions are similar to those of the larger island, although it is neither so fertile in soil nor so well watered as Majorca. The chief towns are Port Mahon (q. v.), and Ciudadela. The annual exports are worth £110,000; the imports, £100,000.

**MINORITIES**, a name of the Franciscan order (q. v.), derived from the original later denomination adopted by their founder, *Fratres Minores*. This name has left its trace in the popular designation of several localities both in English and foreign lands.

**MINOS**, the name of two mythological kings of Crete. The first is said to have been the son of Jupiter and Europa, the brother of Rhadamanthus, the father of Deucalion and Ariadne, and, after his death, a judge in the infernal regions.—The second of the same name was grandson of the former, and son of Lycastus and Ida. To him the celebrated "Laws of Minos" are ascribed, in which he is said to have received instruction from Jupiter. He was the husband of that Pasiphaë who gave birth to the Minotaur (q. v.). Homer and Hesiod know of only one Minos, the king of Cnosus, and son and friend of Jupiter.

**MINOTAUR** (i. e. the Bull of Minos), one of the most repulsive conceptions of Grecian Mythology, is represented as the son of Pasiphaë and a bull, for which she had conceived a passion. It was half-man half-bull, a man with a bull's head. Minos, the husband of Pasiphaë, shut him up in the Cnosian Labyrinth, and there fed him with youths and maidens, whom Athens was obliged to supply as an annual tribute, till Theseus, with the help of Ariadne, slew the monster. The M. is, with some probability, regarded as a symbol of the Phœnician sun-god.

**MINSK**, a government and province of Western or White Russia, lies south-east of Wilna, and contains 34,860 sq. m., with a population (1870) of 1,182,230, composed chiefly of Russians, Lithuanians, Poles, and Jews, with a small percentage of Tartars and gipsies. Five-sevenths of the population profess the Greek religion. The chief articles of export are timber, salt, and corn, which are brought by river-carriage to the Baltic and Black Sea ports. The principal manufactures are fine cloths, linen, and sugar. The soil is not fertile, and is covered to a large extent with woods and marshes, while in many other places it is a sandy waste, but in general the native products suffice for the wants of the inhabitants. The climate is very severe in winter. Cattle and sheep breeding are pursued with tolerable success. The inhabitants of the south or marshy portion of the province are subject to that dreadful disease, the *Plica Polonica* (q. v.).

**MINSK**, the chief town of the government of the same name, is situated on the Bzeloetz, an affluent of the Beresina. It is mostly built of wood, but has many handsome stone edifices, among which are the Greek and Roman Catholic cathedrals and seminaries, the church of St Catharine, a number of educational and philanthropic establishments, a public library, and a theatre. The chief manufactures are woollen cloth and leather. Pop. (1867) 34,277, many of whom are Jews.

**MINSTER**. See **MONASTERY**.

**MINT** (*Mentha*), a genus of plants, of the natural order *Labiata*; with small, funnel-shaped, 4-ld, generally red corolla, and four straight stamens. The species are perennial herbaceous plants, varying considerably in appearance, but all with creeping root-stocks. The flowers are whorled, the whorls often grouped in spikes or heads. The species are widely distributed over the world. Some of them are

very common in Britain, as WATER M. (*M. aquatica*), which grow in wet grounds and ditches, and CORN M. (*M. arvensis*), which abounds as a weed in cornfields and gardens. These and most of the other species have erect stems. All the species contain an aromatic essential oil, in virtue of which they are more or less medicinal. The most important species are SPEARMINT, PEPPERMINT, and PENNY-ROYAL.—SPEARMINT or GREEN M. (*M. viridis*), is a native of almost all the temperate parts of the globe; it has erect smooth stems, from one foot to two feet high, with the whorls of flowers in loose cylindrical or oblong spikes at the top; the leaves lanceolate, acute, smooth, serrated, destitute of stalk, or nearly so. It has a very agreeable odor.—PEPPERMINT (*M. Piperita*), a plant of equally wide distribution in the temperate parts of the world, is very similar to spearmint, but has the leaves stalked, and the flowers in short spikes, the lower whorls somewhat distant from the rest. It is very readily recognised by the peculiar pungency of its odor and of its taste.—PENNY-ROYAL (*M. pulegium*), also very cosmopolitan, has a much-branched prostrate stem, which sends down new roots as it extends in length; the leaves ovate, stalked; the flowers in distant globose whorls. Its smell resembles that of the other mints. All these species, in a wild state, grow in ditches or wet places. All of them are cultivated in gardens; and peppermint largely for medicinal use and for flavoring lozenges. *Mint Sauce* is generally made of spearmint; which is also used for flavoring soups, &c. A kind of M. with lemon-scented leaves, called BERGAMOT M. (*M. citrata*), is found in some parts of Europe, and is cultivated in gardens. Varieties of peppermint and horse-mint (*M. sylvestris*), with *crisped* or *inflato-rugoso* leaves, are much cultivated in Germany under the name of CURLED M. (*Krause-minze*); the leaves being dried and used as a domestic medicine, and in poultices and baths. All kinds of M. are easily propagated by parting the roots or by cuttings. It is said that mice have a great aversion to M., and that a few leaves of it will keep them at a distance.

Peppermint, Penny-royal and Spearmint, are used in medicine. The pharmacopœias contain an *aqua*, *spiritus*, and *oleum* of each of them; the official part being the herb, which should be collected when in flower. *Peppermint* is a powerful diffusible stimulant, and, as such, is antispasmodic and stomachic, and is much employed in the treatment of gastrodynia and flatulent colic. It is also extensively used in mixtures, for covering the taste of drugs. *Penny-royal* and *spearmint* are similar in their action, but inferior for all purposes to peppermint. The ordinary doses are from one to two ounces of the *aqua*, a drachm of the *spiritus* (in a wine-glassful of water), and from three to five drops of the *oleum* (on a lump of sugar).

MINT (Lat. *moneta*), an establishment for making coins or metallic money (see MONEY). The early history of the art being traced under the head NUMISMATICA, the present article is mostly confined to a sketch of the constitution of the British mint, and of the modern processes of coining as there followed.

The earliest regulations regarding the English mint belong to Anglo-Saxon times. An officer called a reeve is referred to in the laws of Canute as having some jurisdiction over it, and certain names which, in addition to that of the sovereign, appear on the Anglo-Saxon coins, seem to have been those of the moneyers, or principal officers of the mint, till recently, an important class of functionaries, who were responsible for the integrity of the coin. Besides the sovereign, barons, bishops, and the greater monasteries had their respective mints, where they exercised the right of coinage, a privilege enjoyed by the archbishops of Canterbury as late as the reign of Henry VIII., and by Woolsey as Bishop of Durham, and Archbishop of York.

After the Norman Conquest, the officers of the royal mint became to a certain extent subject to the authority of the exchequer. Both in Saxon and Norman times, there existed, under control of the principal mint in London, a number of provincial mints in different towns of England; there were no fewer than 88 in the time of Ethelred, and the last of them, were only done away with in the reign of William III. The officers of the mint were formed into a corporation by a charter of Edward II.; they consisted of the warden, master, comptroller, assay-master, workers, coiners, and subordinates.

The signorage for coining at one time formed no inconsiderable item in the revenues of the crown. It was a deduction made from the bullion coined, and comprehended both a charge for defraying the expense of coinage, and the sov-

ereign's profit in virtue of his prerogative. In the reign of Henry VI., the seignorage amounted to 6*d.* in the pound; in the reign of Edward I., 1*s.* 2½*d.* By 1*s.* Car. II. c. 5, the seignorage on gold was abolished, and has never since been exacted. The share, or remedy, as it is now called, was an allowance for the unavoidable imperfection of the coin.

The function of the mint is in theory to receive gold in ingots from individuals, and return an equal weight in sovereigns; but, in point of fact, gold is now exclusively coined for the Bank of England; for, though any one has still the right to coin gold at the mint, the merchant or dealer has ceased to obtain any profit for so doing, as the Bank is compelled to purchase all gold tendered to it at the fixed price of £3, 17*s.* 9*d.* an ounce. The increment on the Assay (q. v.), or on the fineness of the metal, which augments the standard weight, and therefore the value of the gold, is a more considerable source of profit to the importer of gold. The ordinary trade assay, on which the importer purchases the bullion, does not by usage come closer than ⅓ of a carat grain or 7½ grains per lb. troy. Before being coined, the gold is subjected to a second and more delicate assay at the mint, and the importer receives the benefit of the difference, amounting to about 1-16th of a carat grain = 3¼ troy grains, or nearly 8*d.* per lb. weight.

Silver, which was formerly, concurrently with gold, a legal tender to any amount, has, by 56 Geo. III. c. 68, ceased to be so. There is a seignorage on both silver and copper money, amounting in silver to 10 per cent., when the price of silver is 5*s.* per ounce, which, however, from the tear and wear of the coin, brings small profit to the crown. On the copper coinage, the seignorage is no less than 100 per cent. on the average price of copper. The profits of the seignorage, formerly retained by the master of the mint, to defray the expense of coinage, have, since 1837, been paid into the bank, to the credit of the Consolidated Fund.

A new mint was erected on Towerhill in 1810. In 1815, some alterations were made in its constitution; and in 1831 a complete change was introduced in the whole system of administration. The control of the mint was vested in a master and a deputy-master, and comptroller. The mastership, which had, in the early part of the present century, become a political appointment held by an adherent of the government, was restored to the position of a permanent office, the master being the ostensible executive head of the establishment. The operative department was intrusted to the assayer, the melter, and the refiner. The moneyers, who had from early times enjoyed extensive privileges and exemptions, and were contractors with the crown for the execution of the coinage, were abolished, and the contracts with the crown were entered into by the master of the mint, who also made subordinate contracts for the actual manufacture of the coin. Further changes were made on the administration of the mint in 1869. The mastership was added to the duties of the Chancellor of the Exchequer, without any addition of salary, and the offices of deputy-master and comptroller were amalgamated. A yearly saving of £10,000 is believed to have been effected by the changes of 1851, and a further £8000 by those of 1869, with an increase of efficiency. It is at present in contemplation to remove the mint from Towerhill to the rear of the Thames Embankment at Whitefriars, with new and improved machinery. Mints have lately been established at Sydney and Melbourne to coin the gold so largely found in Australia.

*Processes of coining.*—Down to the middle of the 16th c., little or no improvement seems to have been made in the art of coining from the time of its invention. The metal was simply hammered into slips, which were afterwards cut up into squares of one size, and then forged round. The required impression was given to these by placing them in turn between two dies, and striking them with a hammer. As it was not easy by this method to place the dies exactly above each other, or to apply proper force, coins so made were always faulty, and had the edges unfinished, which rendered them liable to be clipped. The first great step was the application of the screw, invented in 1553 by a French engraver of the name of Brucher. The plan was found expensive at first, and it was not till 1662 that it altogether superseded the hammer in the English mint. The chief steps in coining as now practised are as follows: The gold or silver to be coined is sent to the mint in the form of *ingots* (Ger. *eingiessen*, Du. *ingieten*, to pour in, to cast), or castings; those of gold weighing each about 180 oz., while the silver *ingots* are much larger. Before melting, each ingot is tested as to its purity by assaying (q. v.), and then



weighed, and the results carefully recorded. For melting the gold, pots or crucibles of plumbago are used, made to contain each about 1200 oz. The pots being heated white, in furnaces, the charge of gold is introduced along with the proper amount of copper (depending upon the state of purity of the gold as ascertained by the assay), to bring it to the standard, which is 22 parts of pure gold to 2 of copper (see ALLOY). The metal when melted is poured into iron moulds, which form it into bars 21 inches long,  $1\frac{3}{4}$  inch broad, and 1 inch thick, if for sovereigns; and somewhat narrower, if for half-sovereigns. For melting silver (the alloy of which is adjusted to the standard of 222 parts of silver to 18 of copper), malleable iron pots are used, and the metal is cast into bars similar to those of gold.

The new copper, or rather bronze coinage, issued in 1860, is an alloy consisting of 95 parts of copper, 4 of tin, and 1 of zinc. The coins are only about half the weight of their old copper representatives. The processes of casting and coining the bronze are essentially the same as in the case of gold and silver.

The operation of *rolling* follows that of casting. It consists in repeatedly passing the bars between pairs of rollers with hardened steel surfaces, driven by steam-power; the rollers being brought closer and closer as the thickness becomes reduced. At a certain stage, as the bars become longer, they are cut into several lengths; and to remove the hardness induced by the pressure, they are annealed. The finishing rollers are so exquisitely adjusted that the *fillets* (as the thinned bars are called) do not vary in thickness in any part more than the ten-thousandth part of an inch. The slips are still further reduced in the British mint at what is called the "draw-bench," where they are drawn between steel dies, as in wire-drawing, and are then exactly of the necessary thickness for the coin intended.

The fillets thus prepared are passed to the tryer, who, with a hand-punch, cuts a trial-blank from each, and weighs it in a balance; and if it vary more than  $\frac{1}{8}$ th of a grain, the whole fillet is rejected.

For cutting out the *blanks* of which the coins are to be made, there are in the British mint twelve presses arranged in a circle, so that one wheel with driving cams, placed in the centre, works the whole. The punches descend by pneumatic pressure, and the fillets are fed into the presses by boys, each punch cutting out about 60 blanks a minute. The scrap left after the blanks are cut out, called *scissel*, is sent back to be remelted.

Each blank is afterwards weighed by the automaton balance—a beautiful and most accurate instrument, which was added to the mint about twenty years ago. It weighs 23 blanks per minute, and each to the 0.01 of a grain. The standard weight of a sovereign is 123.274 grains, but the mint can issue them above or below this to the extent of 0.2568 of a grain, which is called *the remedy*. Blanks which come within this limit are dropped by the machine into a "medium" box, and pass on to be coined. Those below the required weight are pushed into another box to be remelted, but those above it into another, and are reduced by filing. The correct blanks are afterwards rung on a sounding iron, and those which do not give a clear sound are rejected as dumb.

To insure their being properly milled on the edge, the blanks are pressed edgewise in a machine between two circular steel-plates, which raises the edges, and at the same time secures their being perfectly round. After this they are annealed to soften them, before they can be struck with dies; they are also put into a boiling pot of dilute sulphuric acid, to remove any oxide of copper from the surface. Subsequently, they are washed with water, and dried with great care in hot sawdust, and finally in an oven at a temperature slightly above boiling water. Without these precautions, the beautiful bloom upon new coin could not be secured.

We now come to the press-room, where the blanks receive the impression which makes them perfect coins. The coining-presses, eight in all, are ranged in a row upon a strong foundation of masonry. There is the massive iron frame into which the screw works, the upper part being perforated to receive it. On the bottom of this screw the upper steel die is fixed by a box, the lower die being fixed in another box attached to the base of the press. The dies have, of course, the obverse and reverse of the coin upon them. See *DIE-SINKING*. The blank coin is placed on the lower die, and receives the impression when the screw is turned round so as to press the two dies forcibly towards each other. A steel ring or collar contains the coin while it is being stamped, which preserves its circular form, and also effects the

milling on the edge. In cases where letters are put on the edge of a coin, a collar divided into segments working on centre-pins, is used. On the proper pressure being applied, the segments close round, and impress the letters on the edge of the coin.

The screw of the press is worked by machinery driven by steam-power, and situated in an apartment above the coining-room. The steam-engine exhausts an air-chamber, and from the vacuum produced, an air-engine works a series of air-pumps, which communicate a more exact and regular motion to the machinery of the stamping-presses than by the ordinary condensing engine. The loaded arms strike against blocks of wood, whereby they are prevented from moving too far, and run the risk of breaking the hard steel dies by bringing them in contact. The press brings down the die on the coin with a twisting motion, but if it were to rise up in the same way, it would abrade the coin; there is, in consequence, an arrangement which, by means of a wide notch in the ring, allows the die to be raised up a certain distance before it begins to turn round with the screw.

On the left, is an arrangement for feeding the blanks and removing the coins as they are stamped. A lever, moving on a fulcrum, is supported by a bar fixed to the side of the press. The top of this lever is guided by a sector fixed upon the screw. In this sector there is a spiral groove, which, as the screw turns round, moves the end of the lever to or from the screw, the other end being moved at the same time either towards or away from the centre of the press. The lower end of the lever moves a slider, which is directed exactly to the centre of the press, and on a level with the upper surface of the die. The slider is a thin steel-plate in two pieces united by a joint, and having a circular cavity at the end, which, when its limbs are shut, grasps a piece of coin by the edge. This piece drops out on the limit separating. There is a tube which an attendant keeps filled with blank pieces; it is open at the bottom, so that the pieces rest on the slider. When the press is screwed down, the slider is drawn back to its farthest extent, and its circular end comes exactly beneath the tube. A blank piece of coin now drops in, and is carried, when the screw rises, to the collar which fits over the lower die. The slider then returns for another blank, while the upper die descends to give the impression to the coin. Each time the slider brings a new blank to the die, it at the same time pushes off the piece last struck. An arrangement of springs lifts the milled collar to enclose the coin while it is being struck.

It is found on examining the coins that about 1 in 200 is imperfectly finished; these being rejected, the rest are finally weighed into bags, and subjected to the process of *piecing*. This consists in taking from each bag a certain number of sovereigns or other coins, and subjecting them to a final examination by weight and assay, before they are delivered to the public.

**MINUET**, the air of a most graceful dance, originally from Polton, in France. It is performed in a slow tempo. The first minuet is said to have been composed by Lully the Elder, and was danced by Louis XIV. in 1653. at Versailles, with his mistress. The music of the minuet is in  $\frac{3}{4}$  time, and is still well known in England by the celebrated *Minuet de la Cour*, which is frequently introduced in stage performances.

**MINUTE**, a rough draft of any proceeding or instrument; so called from being taken down shortly and in *minute* or small writing, to be afterwards ingrossed. See **INGROSS**.—**MINUTE**, in Law, is a memorandum or record of some act of a court or of parties; in the latter sense, it is used chiefly in Scotland, as in the case of minute of agreement, minute of sale, &c.

**MINUTE**, the 60th part of an hour; also the 60th part of a degree of a circle. See **SEXAGESIMAL ARITHMETIC**.—**MINUTE**, in Architecture, is the 60th part of the diameter of the shaft of a classic column, measured at the base. It is used as a measure to determine the proportions of the order.

**MIOCENE** (Gr. less recent), a term introduced by Lyell to characterise the Middle Tertiary strata, which he supposes to contain a smaller proportion of recent species of mollusca than the newer Pliocene, and more than the older Eocene. He estimates the proportion of living to fossil species in the Miocene at 25 per cent.

Strata of this age occur in Britain in two limited and far separated localities—in the island of Mull, and at Dartmoor in the south-east of England. In this last dis-

Mirabeau  
Miracle

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trict, they exist at Bovey Tracey, in a flat area of ten miles long by two miles broad, and consist of clay interstratified with beds of imperfect lignites. Pengelly and Heer have recently examined the strata of this small basin, and have found that all the plants are of Miocene age, and belong to the same species as those found in similar deposits, not only on the continent, but in Iceland, Greenland, and Arctic America. Their *facies* indicates a warmer climate than the present, and the geographical range of the species is unexampled in the existing flora. The Mull beds are situated at the headland of Ardun, and consist of interstratified basalts, ashes, and lignites. They are three leaf-beds, varying in thickness from  $1\frac{1}{2}$  to  $2\frac{1}{2}$  feet, separated by two beds of ash, the whole resting on, and covered by strata of basalt. The whole thickness is 131 feet. It is supposed that the leaf-beds were deposited in a shallow lake or marsh, in the vicinity of an active volcano. One of the beds consists of a mass of compressed leaves without stems, and accompanied with abundant remains of an equisetum, which grew in the marsh into which the leaves were blown. The leaves belong to dicotyledonous and coniferæ, and are of species similar to those of Bovey Tracey.

The Fabians of France are of this age, as are also part of the Mollasse of Switzerland, and the Mayence and Vienna basins. Of the same period are the highly fossiliferous deposits in the Sewalik Hills, India, containing the remains of several elephants, a mammoth, hippopotamus, giraffe, and large ostrich, besides several carnivora, monkeys, and crocodiles, and a large tortoise, whose shell measured 20 feet across. The European beds contain the remains of the Dinotherium (q. v.).

MIRABEAU, Honoré Gabriel Riquetti, Comte de, was born 9th March 1749, at Bignon, near Nemours. He was descended, by his own account, from the ancient Florentine family of Arrighetti, who being expelled from their native city in 1263, on account of Ghibelline politics, settled in Provence. Jean de Riquetti or Arrighetti purchased the estate of Mirabeau in 1562; his grandson, Thomas, happened to entertain here, in 1660, Louis XIV. and Cardinal Mazarin, on which occasion he received from the monarch the title of Marquis Victor Riquetti. Marquis de Mirabeau (born 1715, died 1789), the father of Honoré, was a vain and foolish man, wasted his patrimony, wrote books of philanthropy and philosophy, as "*L'Ami des Hommes*" (5 vols. Par. 1755), and was a cruel tyrant in his own house. He procured no fewer than fifty-four *lettres de cachet* at different times against his wife and his children. Honoré, his eldest son, was endowed with an athletic frame and extraordinary mental abilities, but was of a fiery temper, and disposed to every kind of excess. He became a lieutenant in a cavalry regiment; but continued to prosecute various branches of study with great eagerness, whilst outrunning his companions in a career of vice. An intrigue with the youthful wife of an aged marquis brought him into danger, and he fled with her to Switzerland, and thence to Holland, where he subsisted by his pen, amongst other productions of which, his "*Essai sur le Despotisme*" attracted great attention. Meanwhile, sentence of death was pronounced against him; and the French minister, at his father's instigation, demanding that he should be delivered up to justice, he and his paramour were apprehended at Amsterdam, and he was brought to the dungeon at Vincennes, and there closely imprisoned for 42 months. During this time he was often in great want, but employed himself in literary labors, writing an "*Essai sur les Lettres de Cachet et les Prisons d'état*," which was published at Hamburg (2 vols. 1782), and a number of obscene tales, by which he disgraced his genius, although their sale supplied his necessities. After his liberation from prison, he subsisted chiefly by literary labor, and still led a very profligate life. He wrote many effective political pamphlets, particularly against the financial administration of Calonne, receiving pecuniary assistance. It was said, from some of the great bankers of Paris; and became one of the leaders of the Liberal party. When the States-general were convened, he sought to be elected as a representative of the nobles of Provence, but was rejected by them on the ground of his want of property; and left them with the threat that, like Marius, he would overthrow the aristocracy. He purchased a draper's shop, offered himself as a candidate to the Third Estate, and was enthusiastically returned both at Aix and Marseille. He chose to represent Marseille, and by his talents and admirable oratorical powers soon acquired great influence in the States-general and National Assembly. Barnave well characterised him as "the Shakespeare of eloquence." He stood forth as the opponent of the court and of the

aristocracy, but regarded the country as by no means ripe for the extreme changes proposed by political theorists, and labored, not for the overthrow of the monarchy, but for the abolition of despotism, and the establishment of a constitutional throne. To suppress insurrection, he effected, on 8th July 1789, the institution of the National Guard. In some of the contests which followed, he sacrificed his popularity to maintain the throne. The more that anarchy and revolutionary frenzy prevailed, the more decided did he become in his resistance to their progress; but it was not easy to maintain the cause of constitutional liberty at once against the supporters of the ancient despotism and the extreme revolutionists. The king and his friends were long unwilling to enter into any relations with one so disreputable, but at last, under the pressure of necessity, it was resolved that M. should be invited to become minister. No sooner was this known, than a combination of the most opposite parties, by a decree of 7th November 1789, forbade the appointment of a deputy as minister. From this time forth, M. strove in vain in favor of the most indispensable prerogatives of the crown, and in so doing exposed himself to popular indignation. He still continued the struggle, however, with wonderful ability, and sought to reconcile the court and the Revolution. In December 1790, he was elected president of the Club of the Jacobins, and in February 1791, of the National Assembly. Both in the Club and in the Assembly, he displayed great boldness and energy; but soon after his appointment as president of the latter, he sank into a state of bodily and mental weakness, consequent upon his great exertions and his continued debaucheries, and died 2d April 1791. He was interred with great pomp in the church of Saint Genevieve, the "Panthéon;" but his body was afterwards removed, to make room for that of Marat. A complete edition of his works was published at Paris in 9 vols. in 1826—1827. His natural son, Lucas Montigny, published "*Mémoires Biographiques, Littéraires et Politiques de Mirabeau*" (2d edit. 8 vols. Par. 1841), the most complete account which we have of his life. See also Carlyle's sketch of Mirabeau in his "*Miscellaneous Essays*," and his "*French Revolution*."

MIRACLE, a term commonly applied to certain marvellous works (healing the sick, raising the dead, changing of water into wine, &c.) ascribed in the Bible to some of the ancient prophets, and to Jesus Christ, and one or two of his followers. It signifies simply that which is wonderful—a thing or a deed to be wondered at, being derived directly from the Latin *miraculum*, a thing unusual—an object of wonder or surprise. The same meaning is the governing idea in the term applied in the New Testament to the Christian miracles, *teras*, a marvel; a portent; besides which, we also find them designated *dynamis*, powers, with a reference to the power residing in the miracle-worker; and *semeia*, signs, with a reference to the character and pretensions of which they were assumed to be the witnesses or guarantees. Under these different names, the one fact recognised is a deed done by a man, and acknowledged by the common judgment of men to exceed man's ordinary powers; in other words, a deed *supernatural*, above or beyond the common powers of nature, as these are understood by men.

In the older speculations on the subject, a miracle was generally defined to be a violation or suspension of the order of nature. While, on the one hand, it was argued (as by Hume), that such a violation or suspension was absolutely impossible and incredible; it was maintained, on the other, that the Almighty, either by his own immediate agency, or by the agency of others, could interfere with the operation of the laws of nature, in order to secure certain ends, which, without that interference, could not have been secured, and that there was nothing incredible in the idea of a law being suspended by the Person by whom it had been made. The laws of nature and the will or providence of God were, in this view, thus placed in a certain aspect of opposition to each other, at points here and there clashing, and the stronger arbitrarily asserting its superiority. Such a view has, with the advance of philosophical opinion, appeared to many to be inadequate as a theory, and to give an unworthy conception of the Divine character. The great principle of Law, as the highest conception not only of nature, but of Divine Providence, in all its manifestations, has asserted itself more dominantly in the realm of thought, and led to the rejection of the apparently conflicting idea of "interference," implied in the old notion of miracle. Order in nature, and a just and uncapricious will in God, were felt to be first and absolutely necessary principles. The idea of miracle, accordingly, which

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seems to be now most readily accepted by the advocates of the Christian religion, has its root in this recognised necessity.

All law is regarded as the expression, not of a lifeless force, but of a perfectly wise and just will. All law must develop itself through natural phenomena; but it is not identified with or bound down to any necessary series of these. If we admit the mainspring of the universe to be a living will, then we may admit that the phenomena through which that will, acting in the form of law, expresses itself, may vary without the will varying or the law being broken. We know absolutely nothing of the mode of operation in any recorded miracle; we only see certain results. To affirm that these results are either impossible in themselves, or necessarily violations of natural law, is to pronounce a judgment on imperfect data. We can only say that, under an impulse which we must believe proceeds from the Divine will, in which all law exists, the phenomena which we have been accustomed to expect have not followed on their ordinary conditions. But from our point of view we cannot affirm that the question as to *how* this happens is one of interference or violation; it is rather, probably, one of higher and lower action. The miracle may be but the expression of one Divine order and beneficent will in a new shape—the law of a greater freedom, to use the words of Treuch, swallowing up the law of a lesser.

Nature being but the plastic medium through which God's will is ever manifested to us, and the design of that will being, as it necessarily must be, the good of his creatures, that theory of miracle is certainly most rational which does not represent the ideas of laws and of the will of God as separate and opposing forces, but which represents the Divine will as working out its highest moral ends, not against, but through law and order, and evolving from these a new issue, when it has a special beneficent purpose to serve. And thus, too, we are enabled to see in miracle not only a wonder and a power, but a sign—a revelation of Divine character, never arbitrary, always generous and loving, the character of one who seeks through all the ordinary courses of nature and operation of law to further His creatures' good, and whose will, when that end is to be served, is not restricted to any one necessary mode or order of expression. Rightly interpreted, miracle is not the mere assertion of power, or a mere device to impress an impressible mind; it is the revelation of a will which, while leaving nature as a whole to its established course, can yet witness to itself as above nature, when, by doing so, it can help man's moral and spiritual being to grow into a higher perfection.

The evidence for the Christian miracles is of a twofold kind—external and internal. As alleged facts, they are supposed to rest upon competent testimony, the testimony of eye-witnesses, who were neither deceived themselves, nor had any motive to deceive others. They occurred not in privacy, like the alleged supernatural visions of Mohammed, but for the most part in the open light of day, amidst the professed enemies of Christ. They were not isolated facts, nor wrought tentatively, or with difficulty; but the repeated, the overflowing expression, as it were, of an apparently supernatural life. It seems impossible to conceive, therefore, that the apostles could have been deceived as to their character. They had all the means of scrutinising and forming a judgment regarding them that they could well have possessed; and if not deceived themselves, they were certainly not deceivers. There is no historical criticism that would now maintain such a theory; even the most positive unbelief has rejected it. The career of the apostles forms throughout an irrefragable proof of the deep-hearted and incorruptible sincerity that animated them. The gospel miracles, moreover, are supposed in themselves to be of an obviously Divine character. They are, in the main, miracles of healing, of beneficence, in which the light equally of the Divine majesty and of the Divine love shines—witnessing to the eternal life which underlies all the manifestations of decay, and all the traces of sorrow in the lower world, and lifting the mind directly to the contemplation of his life.

MIRACLE PLAYS. See MYSTERIES.

MIRA'GE, a phenomenon extremely common in certain localities, and as simple in its origin as astonishing in its effects. Under it are classed the appearance of distant objects as double, or as if suspended in the air, erect or inverted, &c. One cause of mirage is a diminution of the density of the air near the surface of the

earth, produced by the transmission of heat from the earth, or in some other way; the denser stratum being thus placed *above*, instead of, as is usually the case, *below* the rarer. Now, rays of light from a distant object, situated in the denser medium (i. e. a little above the earth's level), coming in a direction nearly parallel to the earth's surface, meet the rarer medium at a very obtuse angle, and (see REFRACTION) instead of passing into it, are reflected back to the dense medium; the common surface of the two media acting as a mirror. Suppose, then, a spectator to be situated on an eminence, and looking at an object situated like himself in the denser stratum of air, he will see the object by means of directly transmitted rays; but besides this, rays from the object will be reflected from the upper surface of the rarer stratum of air beneath to his eye. The image produced by the reflected rays will appear inverted, and below the real object, just as an image reflected in water appears when observed from a distance. If the object is a cloud or portion of sky, it will appear by the reflected rays as lying on the surface of the earth, and bearing a strong resemblance to a sheet of water; also, as the reflecting surface is irregular, and constantly varies its position, owing to the constant communication of heat to the upper stratum, the reflected image will be constantly varying, and will present the appearance of a water surface ruffled by the wind. This form of mirage, which even experienced travellers have found to be completely deceptive, is of common occurrence in the arid deserts of Lower Egypt, Persia, Tartary, &c.

In particular states of the atmosphere, reflection of a portion only of the rays takes place at the surface of the dense medium, and thus double images are formed, one by reflection, and the other by refraction—the first inverted, and the second erect. The phenomena of mirage are frequently much more strange and complicated, the images being often much distorted and magnified, and in some instances occurring at a considerable distance from the object, as in the case of a tower or church seen over the sea, or a vessel over dry land, &c. The particular form of mirage known as *looming*, is very frequently observed at sea, and consists in an excessive apparent elevation of the object. A most remarkable case of this sort occurred on the 26th of July 1798, at Hastings. From this place the French coast is fifty miles distant; yet, from the sea-side the whole coast of France from Calais to near Dieppe was distinctly visible, and continued so for three hours. In the Arctic regions it is no uncommon occurrence for whale-fishers to discover the proximity of other ships by means of their images seen elevated in the air, though the ships themselves may be below the horizon. Generally, when the ship is above the horizon, only one image, and that inverted, is found; but when it is wholly or in great part below the horizon, double images, one erect and the other inverted, are frequently seen. The faithfulness and distinctness of these images at times may be imagined from the fact, that Captain Scoresby, while cruising off the coast of Greenland in 1822, discovered the propinquity of his father's ship from its inverted image in the sky. Another remarkable instance of M. occurred in May 1854, when, from the deck of H. M. screw-steamer, *Archer*, then cruising off Oesel, in the Baltic, the whole English fleet of nineteen sail, then nearly thirty miles distant, was seen as if suspended in the air upside down. Beside such phenomena as these, the celebrated *Fata Morgana* (q. v.) of the Straits of Messina sinks into insignificance. The *Spectre of the Brocken*, in Hanover, is another celebrated instance of mirage. Its varieties are indeed numberless, and we refer those who wish for further information to Brewster's "Optics," Biot's "Traité de Physique," and for the mathematical theory of the mirage to the works of Biot, Monge, and Wollaston. See also REFLECTION and REFRACTION.

**MIRANDOLA**, a town of Northern Italy, in the province of Modena, and 20 miles north-north-east of the city of that name. It stands in the midst of a low-lying and somewhat unhealthy flat, and contains numerous churches, a cathedral, and a citadel. Rice is much cultivated in the vicinity, and the breeding of silk-worms is an important branch of industry. Pop. of town (1871), 3059; of commune, 13,170.

**MIRECOURT**, a town of France in the department of Vosges, in a picturesque district, 20 miles south of Nancy. It is famous for its manufactures of lace, and of church-organs and stringed musical instruments. Pop. (1876) 5162.

**MIRFIELD**, a manufacturing village of the West Riding of Yorkshire, England, three miles east of Dewsbury. The manufactures are fancy and other woollen

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fabrics, and cotton goods. It is one of the chief railway centres in the country. Pop. (1871) 12,869.

**MIRPU'R**, a flourishing town of India, in Sind, on the left bank of the Pinari, 45 miles south of Hyderabad. It contains a fort capable of accommodating 200 men, and which commands the route from Hyderabad to Cutch. The surrounding district is fertile and well cultivated. Pop. 3000.

**MIRROR**, a reflecting surface, usually made of glass, lined at the back with a brilliant metal, so as strongly to reflect the image of any object placed before it. When mirrors were invented, is not known, but the use of a reflecting surface would become apparent to the first person who saw his own image reflected from water; and probably for ages after the civilisation of man commenced, the still waters of ponds and lakes were the only mirrors; but we read in the Pentateuch of mirrors of brass being used by the Hebrews. Mirrors of bronze were in very common use amongst the ancient Egyptians, Greeks, and Romans, of which many specimens are preserved in museums. Praxiteles taught the use of silver in the manufacture of mirrors in the year 328 B.C. Mirrors of glass were first made at Venice in 1300; and judging from those still in existence—of which one may be seen at Holyrood Palace, in the apartments of Queen Mary—they were very rude contrivances, compared with modern ones. It was not until 1678 that the making of mirrors was introduced into England. It is now a very important manufacture; and mirrors can be produced of any size to which plate-glass can be cast. After the plate of glass is polished on both sides, it is laid on a perfectly level table of great strength and solidity, usually of smooth stone, made like a billiard-table with raised edges; a sheet or sheets of tinfoil sufficient to cover the upper surface of the glass are then put on, and rubbed down smooth, after which the whole is covered with quicksilver, which immediately forms an amalgam with the tin. The superfluous mercury is then run off, and a woollen cloth is spread over the whole surface, and square iron weights are applied. After this pressure has been continued a day and night, the weights and the cloth are removed, and the glass is removed to another table of wood, with a movable top, which admits of gradually increasing inclination until the unamalgamated quicksilver has perfectly drained away, and only the surface of perfect amalgam remains coating the glass, and perfectly adherent to it.

Heat is reflected like light; so that a concave M. may be used to bring rays of heat to a focus. In this way combustible substances may be set on fire at a distance from the reflector whence they receive their heat. Thus used, a M. is called a *Burning M.*

**MIRTA**, a town of India, in the Rajpoot state of Jodhpur, stands on high ground near the source of a tributary of the Luni, 230 miles south-west of Delhi. M. is supplied with good water from three large tanks. Pop. estimated at 25,950.

**MIRZA**, a contraction of *Emir Zadah*, "son of the prince," is, when prefixed to the surname of the individual, the common title of honor among the Persians; but when annexed to the surname, it designates a prince or a male of the blood-royal.

**MIRZAPUR**, a town of British India, capital of the district of the same name on the right bank of the Ganges, which is here half a mile wide, and crossed by a ferry, 40 miles south-west of Benares. It has some manufactures of carpets, cottons, and silks, and is the greatest cotton-mart in India. Pop. (1872) 67,274. The district of M., in the North-west Provinces, is watered by the Ganges and the Son. Lat. 23° 50'—25° 30' N.; long. 82° 11'—83° 39' E. Area, 5285 square miles. Pop. (1872) almost all Hindus, 1,054,413. The chief productions, beside the usual cereals, are cotton, indigo, and sugar. The climate is, on the whole, unhealthy for Europeans.

**MISDEMEANOR** is one of the technical divisions of crimes, by the law of England and Ireland. The usual division of crimes is into treason (which generally stands by itself, though, strictly speaking, included in), felony, and misdemeanor. The offence of greatest enormity is treason, and the least is misdemeanor. The original distinction between felony and misdemeanor consisted in the consequences of a conviction. A party convicted of felony, if capital, forfeits both his real and personal estate; if not capital, his personal estate only. A party convicted of mis-

demeanor forfeits none of his property. The distinction is not kept up between the two classes of crimes by any greater severity of punishment in felony, for many misdemeanors are punished as severely as some felonies. But it has been the practice of the legislature, when creating new offences, to say whether they are to be classed with felony or misdemeanor; and when this is done, the above incidents attach to the conviction accordingly.

**MISE'NO**, a promontory of the province of Naples, 2 miles south-west of the city of Naples. On the outskirts of the promontory are the extensive ruins of the ancient city of Misenum, including a vast church and theatre. M. is much visited on account of its wonderful grotto Draconara, and a curious subterranean building or labyrinth, called the Hundred Chambers, supposed to have been anciently employed as dungeons.

**MISERE'RE**, the name by which, in Catholic usage, the 50th Psalm of the Vulgate (51st in authorised version) is commonly known. It is one of the so-called "Penitential Psalms," and is commonly understood to have been composed by David in the depth of his remorse for the double crime which the prophet Nathan rebuked in the well-known parable (2 Sam. xii.). Another opinion, however, attributes this psalm to Manasse, or to some of the psalm-writers of the Captivity. The *Miserere* is of frequent occurrence in the services of the Roman Church; and in the celebrated service of *Tenebræ*, as performed in the Sixtine Chapel at Rome, it forms, as chanted by pope's choir, one of the most striking and impressive chants in the entire range of sacred music. It is sung on each of the three nights in Holy Week (q. v.) on which the office of *Tenebræ* is held, with different music on each of the three occasions, the three composers being Bal, Baiul, and the still more celebrated Allegri.—*Miserere* is also the name of one of the evening services in Lent, which is so called from the singing of that psalm, and which includes a sermon, commonly on the duty of sorrow for sin.

**MISERERE**, a projection on the under side of the seats of the stalls of medieval churches and chapels, &c. They are usually ornamented with carved work, and are so shaped, that when the seats-proper are folded up, they form a small seat at a higher level, sufficient to afford some support to a person resting upon it. Aged and infirm ecclesiastics were allowed to use these during long services.

**MISFEA'SANCE**, in Legal Language, means the doing of a positive wrong, in contradistinction to nonfeasance, which means a mere omission. Acts are sometimes followed with different legal consequences, according as they fall under the head of misfeasance or nonfeasance.

**MI'SHNA** (from Heb. *shana*, to learn; erroneously held to designate Repetition) comprises the body of the "Oral Law," or the juridico-political, civil, and religious code of the Jews; and forms, as such, a kind of complement to the Mosaic or Written Law, which it explains, amplifies and immutably fixes. It was not, however, the sole authority of the schools, and the masters, on which these explanations and the new ordinances to which they gave rise depended, but rather certain distinct and well-authenticated traditions, traced to Mount Sinai itself. No less were certain special letters and signs in the Written Law appealed to in some cases, as containing an indication to the special, newly issued, or fixed prohibitions or rules. See **HALACHA**. The *Mishna* (to which the *Toseftas* and *Boraithas* form supplements) was finally redacted, after some earlier incomplete collections, by Jehudah Hanassal, in 220 A.D., at Tiberias. It is mostly written in pure Hebrew, and is divided into six portions (*Sedarim*): 1. *Zeraim* (Seeds), on Agriculture; 2. *Moed* (Feast), on the Sabbath, Festivals and Fasts; 3. *Nashim* (Women), on Marriage, Divorce, &c. (embracing also the laws on the Nazirship and Vows); 4. *Nezikin* (Damages), chiefly civil and penal law (also containing the ethical treatise *Aboth*); 5. *Kodashim* (Sacred Things), Sacrifices, &c.; description of the Temple of Jerusalem, &c.; 6. *Tehoroth* (Purifications), on pure and impure things and persons. See also **TALMUD**.

**MI'SHMER BITTER**, the root of *Coptis Teeta* (see **COPTIS**), a plant found in the mountainous regions on the borders of India and China; of the same genus with the Golden Thread of the northern parts of the world, and not unlike it. The root is in much use and esteem in some parts of the East as a



stomachic and tonic, and has begun to be known in Europe.—The root of *C. trifoliata* is also used as a bitter.

**MISILME'RI** (corrupted from *Menzil-al-Amir*, Village of the Emire), a town of the island of Sicily, in the province of Palermo, 7 miles south-east of Palermo city. It is a straggling, poverty-stricken town. It was at M. that Garibaldi, in May 1860, joined the Sicilian insurgents; and it was by a short cut from M. to Palermo, through the Pass of Mezzaguna, that he advanced on the latter city and took it by a *coup de main*. M. used to be a notorious harbor of banditti. Pop. 7250.

**MISKÓLCZ**, the principal town in the county of Borsod, Hungary, situated at the extremity of a beautiful valley, 25 miles north-east of Erlau. It is connected with Debreczin by railway, and contains numerous churches, two gymnasia, and other educational institutions. Wine and melons are extensively cultivated. From the iron obtained in the vicinity, the best steel in Hungary is made. The chief trade is in wine. Pop. (1870) 21,119.

**MISNO'MER** is the giving of a wrong name to a party in a suit. Formerly, the objection of misnomer was of some importance, but now is of none, as it is easily cured by amendment.

**MISPRI'SION** is, in English Law, a clerical error made in drawing up a record of a court of law.

**MISREPRESENTATION**, in point of law, or, as it is most frequently termed, fraudulent misrepresentation, is that kind of lie for which courts of law will give redress. It consists in a wilful falsehood as to some material thing connected or not with some contract; the object being that the party deceived should act upon it as true. The legal result is, that if the party so relying on its truth and acting on it suffer damage, he can sue the deceiver for such damage. It has sometimes been supposed that the deceit or misrepresentation must have reference to some contract, or arise out of some confidential relation between the parties, and that the party making it should have some private interest to serve; but this is a mistake; and recent cases have established, that if a person wilfully—i. e., either not knowing anything at all one way or the other about the matter, or knowing the real truth, misrepresent something, with the intention that a stranger should act on such misrepresentation, and such stranger does so act on it, and suffer damage, then the right of action accrues to the deceived party. One remarkable exception to this doctrine, however, occurs in the case of the contract of marriage, where either party has in general no remedy whatever against the other for misrepresentations as to his or her property, connections, &c. It is not necessary that the misrepresentation should be made in writing, in order to give rise to the action, except in cases where the party gives representations as to the conduct, credit, ability, trade, or dealings of a third party, in order that such third party shall obtain credit, money, or goods thereby. The doctrine of misrepresentation has acquired great consequence of late, owing to the extension of the system of joint-stock companies, and the practice of the directors and officers publishing, or being parties to fraudulent reports, accounts, and circulars as to the credit and stability of such undertakings. It is now settled, that not only every director, but every clerk in the service of the directors, who knowingly and wilfully concurs and takes a part in publishing or circulating such false reports, whereby strangers are led to believe and act on them, and thereby suffer pecuniary loss, is liable to an action of damages at the suit of such strangers. It is also a general rule affecting contracts (other than marriage), that misrepresentation in some material point bearing on the contract, and likely to induce the party to enter into such contract, will render the contract void; but in order to make a trifling misrepresentation have the same effect, the party must warrant such representation to be true; in which case, whether trifling or not, or whether wilful or not, a misrepresentation avoids the contract; and this is generally the case in contracts of life and fire insurance. Against such a practice, Lord St Leonards lately remonstrated, as one involving great hardship to the class of insurers, who, after paying premiums for years, find at last their security gone. Another class of fraudulent misrepresentations, of great consequence, and now brought within the

criminal law to a large extent, is that of counterfeiting trade-marks, as to which, see **TRADE-MARKS**.

**MISSA DI VOCE**, a term used in the art of singing, meaning the gradual swelling and again diminishing of the sound of the voice on a note of long duration.

**MISSAL**, the volume containing the prayers used in the celebration of the Mass. Anciently, considerable variety in minor details prevailed among the books in use in different countries, and even in different churches of the same country. With the view of restoring uniformity, the pope, in virtue of a decree of the Council of Trent, in 1570, ordered that all churches which had not, for a clearly ascertained period of 200 years, enjoyed an uninterrupted use of a peculiar service-book of their own, should thenceforth adopt the Roman Missal. Of this exemption, several churches in Germany, France, and even in Italy, availed themselves; but in later times, the great majority have conformed to the Roman use. The Roman Missal has twice since that date been subjected to revision and correction—in 1604 by Clement VIII., and in 1634 by Urban VIII. The latter recension still continues in use. The missals of the oriental rites differ from that of the Roman Church, each having for the most part its own proper form. See **LITURGY**.

**MISSIONS**, enterprises of the Christian Church for the conversion of the nations to Christianity, by sending to them teachers called *missionaries*.

The first Christians displayed great zeal in preaching the gospel to the heathen; Christian teachers continued to go forth for this purpose into heathen countries until about the 9th c., and although other and less worthy means were too often employed, the labors of Palladius in Ireland, of Columba in Scotland, of Augustine in England, of Gallus and Emmeran in Alemannia, of Killan in Bavaria, of Willibrod in Franconia, of Swidvrit in Friesland, of Siegfried in Sweden, of Boniface in Thuringia and Saxony, of Adalbert in Prussia, of Cyril and Methodius amongst the Slavonians, and of many such early missionaries, were unquestionably very instrumental in the extension of Christianity in Europe. After the Reformation, the Roman Catholic Church, roused to activity by its losses and dangers, not only sent forth missionaries to confirm its adherents in Protestant countries, and to win back Protestants, but also sought to repair its losses by new acquisitions from the vast domain of heathenism. With this view, the "Congregatio de Propaganda Fide" was constituted by Gregory XV. in 1622, and the "Collegium de Propaganda Fide" (see **PROPAGANDA**) by Urban VIII. in 1627, and in a number of places, institutions, called *seminaries*, were established for the training of missionaries. Jesuit missionaries earnestly prosecuted their work amongst the Indians of South America, from the middle of the 16th c. to the middle of the 18th, when they were expelled by the Portuguese and Spanish governments, because their political power had become too formidable. They are accused of administering baptism with too great readiness; but they were certainly successful in extending civilisation amongst the Indians, particularly of Paraguay. Jesuit missions to India and Japan were founded by Francis Xavier (q. v.) in the middle of the 16th century. In Japan, the missionaries made great progress at first; and in 1582 they boasted of 150,000 converts, 200 churches, and 59 religious houses of their order in that empire; but ere the middle of the 16th c., the whole work had been overthrown, and every missionary expelled. In China, similar rapid success was enjoyed, and was followed by a similar period of persecution, although the destruction effected was more partial than in Japan, and the Church of Rome continued to subsist in China, its missionaries and members enduring great hardships, and many of them evincing their sincerity even by their death. There are not a few Roman Catholics in China at the present time. In Abyssinia also, the Jesuits made great progress in the 17th century, and for a time attained great power in the country; but their interference in political matters led to their complete expulsion. In the 17th c., the Jesuits boasted of the vast success of their mission in Madura, a province of Southern India; but it was found to be rather apparent than real, and to have been attained by a compromise of Christianity and the employment of unworthy means, so that, after long contests in the papal court, a decision was pro-

nounced against the Jesuits, and their connection with Madura was dissolved in the middle of the 18th century.

For a long period after the Reformation, the Protestant Church seems to have been little sensible of the duty of laboring for the propagation of Christianity; nor was it until the present century that missionary zeal began to be largely developed. In the middle of the 17th c. (1647), indeed, an act of the English parliament established the *Society for Propagating the Gospel in Foreign Parts*, and at the close of the century (1693), the *Society for Promoting Christian Knowledge* was established. A few missionaries labored with zeal and success among the North American Indians, in which field the names of Elliot and Mayhew are particularly distinguished in the 17th c., and that of Brainerd in the 18th; but the commencement of more systematic and continuous missionary enterprise may be reckoned from the establishment of the first Protestant mission to India, which did not take place till the beginning of the 18th c., when Bartholomew Ziegenbalg and another were sent thither by Frederick IV. of Denmark, and settled in a small territory then belonging to Denmark on the coast of Coromandel. The mission in the south of India soon received the support of the English *Society for Promoting Christian Knowledge*, and was maintained and extended chiefly by that Society during the whole of the 18th century. Amongst the missionaries who labored in this field, the name of Swartz is particularly distinguished; and the success which attended his exertions, and the influence which he acquired in the country, were equally remarkable. He died in 1793. Since that time, the missionary work in the south of India has been carried on with continued success, and by the missionaries of a number of societies. Greater progress has been made there than in any other part of India, nor, indeed, was the work commenced in any other part of India till almost a century later.—The Moravian Church early entered upon missionary enterprise, and was the first Protestant Church which did so in its united or corporate character; and very successful missions of the United Brethren were planted in the 18th c. at the Cape of Good Hope, in the West Indies, and in Labrador. Greenland had previously been made the field of similar enterprise by missionaries from Norway. The mission to Greenland was founded by Hans Egede (q.v.), in 1721, and has been maintained to the present day. Its success has been such, that the greater portion of the Greenlanders have now been converted to Christianity, and much of the rudeness of their former manner of life has disappeared.—Towards the close of the 18th c., some of the great missionary societies still existing in England were formed—the *Baptist Missionary Society* in 1792, the *London Missionary Society* in 1795. About the same time, the *British and Foreign Bible Society*, and the *Religious Tract Society*, were formed, which have co-operated with all the missionary societies as most important auxiliaries. The *Baptist Missionary Society*, immediately after its formation, sent missionaries to the north of India. Dr Carey was one of its first, and also one of its most eminent missionaries. India is now a field of labor for many missionary societies, not only of Britain, but also of America and of the continent of Europe. The *London Missionary Society* sent its first missionaries to the South Sea Islands, and the mission was maintained for about 16 years, amidst many difficulties, without any apparent success; but its success was afterwards great and rapid, first in Tahiti, and afterwards in other islands, so that now many of the islands of the South Seas are entirely Christian. The *London Missionary Society* soon entered also upon other fields of labor, and now maintains missions to many parts of the world. It was at first composed of members of almost all Protestant denominations; but the formation of other societies, and the engagement of churches as such in missionary enterprise—as the Wesleyan Methodist Church—have left this society now in a great measure to the English Independents. One of the most important societies founded during the present century, the *Church Missionary Society*, formed by members of the Church of England, has sent forth missionaries to many fields. They have been particularly successful in New Zealand, the west of Africa, and about Hudson's Bay; and they recently entered Abyssinia. The various churches in Scotland also support vigorous mission agencies. The late Dr Livingstone, of the *London Missionary Society*, explored vast regions in Central Africa. Fired by his example, the friends of missions in Scotland subscribed £12,000 to found *Livingstonia*, a memorial mission station on Lake Nyassa, under the management of the

Free Church Foreign Missions Committee; and an expedition arrived there and established itself in 1876. Various other missionary societies, Catholic and Protestant, have selected stations in the region of the great lakes. The Wesleyan Methodists have missions in many parts of the world. They have been particularly successful in the Fiji Islands, and in parts of the west of Africa.—The *American Board of Commissioners for Foreign Missions* was formed in 1810, and was soon followed by other missionary societies in America, some of which rival those of Britain in magnitude and importance. One of the first enterprises of the American Board was the mission to the Sandwich Islands, founded in 1819, which has resulted in the general Christianisation of these islands, and in their civilisation to a degree which, considering the shortness of the time, may well be regarded with admiration. The *American Baptist Missionary Society* has occupied Burmah and the Eastern Peninsula as one of its principal spheres of labor, and there its missionaries have enjoyed remarkable success in the Christianisation and civilisation of the people called Karens. Protestant missionary societies have also been formed on the continent of Europe, of which the first was that of Basel, in 1816, and the next was that of Berlin, in 1828; and some of these have also maintained successful missions in heathen countries. The instances of most marked and extensive success of missions are those which have been already noticed, and that of Madagascar, where missionaries of the London Missionary Society enjoyed the protection and favor of King Radama I., and the church planted by them continued to exist, notwithstanding severe persecution, and the martyrdom of not a few of its members, during the next reign, and is a wonderfully flourishing church at the present day. In the south of Africa, also, important results have been attained. Access has recently been obtained to China, and a number of Protestant churches and societies have entered energetically upon that field. Preparation had been previously made for this, by missionary labors amongst the Chinese in the Eastern Peninsula, and by the study of the language, the compilation of grammars and dictionaries, and the translation of the Bible into the Chinese language. Indeed, it must be reckoned as among the services rendered to mankind by Christian missionaries in modern times, that they have not only translated the Bible and other religious books into many languages, but have reduced many barbarous tongues to writing, and have prepared grammars and dictionaries, thereby contributing not a little, independently of their highest aim, to the promotion of knowledge, civilisation, and the welfare of the human race.

The progress of Christian missions to Mohammedan countries has hitherto been very small, although numerous converts from Mohammedanism, as well as from heathenism, have been made in India. Of late, some have thought they observed a movement among the Mohammedans of India, apparently tending towards Christianity; but at the same time there has been a new awakening of Mohammedanism itself in the Eastern Peninsula and the islands of the Malay Archipelago. Missions to the Jews have for several years engaged not a little of the attention of some portions of the Christian Church, particularly in England and Scotland. Missions have been planted in places where Jews are numerous, and already with considerable success.

**MISSISSIPPI**, one of the south-western United States of America, lies in lat.  $30^{\circ} 13' - 36^{\circ}$  n., and long.  $89^{\circ} 7' - 91^{\circ} 41'$  w. It is 832 miles from north to south, and from 78 to 118 miles from east to west, containing an area of 47,156 square miles. It is bounded n. by Tennessee, e. by Alabama, s. by the Gulf of Mexico and East Louisiana, and w. by the rivers Pearl and Mississippi. The state also includes a cluster of islands in the Gulf, of which the principal are Horn, Deer, and Ship Islands. There are 73 counties. The principal towns are Jackson (the capital), Natchez, Vicksburg, and Columbus. There are 88 miles of sea-coast, but no good harbors. The surface is undulating, and generally very fertile, with river-bottoms of great productiveness. The sea-coast is sandy, but well timbered with live oak, magnolia, and pine, and is considered one of the most healthy districts in the world. The state borders for 500 miles on the Mississippi, and is drained by its tributaries, the Yazoo, Black, Sunflower, &c., and by the Pearl and Pascagoula, flowing into the Gulf of Mexico. The country is of the Tertiary and Upper Secondary formations, with great alluvial valleys; the climate semi-tropical; the chief productions, cotton, sugar, maize, wheat, sweet potatoes, peaches, figs, oranges, &c. In its forests are found the deer, puma, bear, wolf, wild-cat, paroquets, wild turkeys, and pi-

geons, with fish and alligators in the rivers. The state is well provided with railways, and has immense wealth and resources. In 1870, with a population of 1,131,597, it produced 963,111 lbs. of cotton, and 21,340,800 bushels of Indian corn. In 1874, there were 1 university, 4 colleges, an agricultural college, an institution for deaf-mutes and the blind, also a lunatic asylum. This region was traversed by De Soto in 1542. La Salle descended the Mississippi in 1682, and claimed the country for France; in 1698, M. d'Iberville formed settlements on the coast at Ship Island and Biloxi. Natchez was settled in 1700; but in 1728 this settlement was destroyed by the Natchez tribe of Indians, who were afterwards defeated, and the survivors sold into slavery in St Domingo. M. was admitted to the Union in 1817; it seceded in 1861, and joined the Southern Confederacy. In 1869, M. agreed to the new constitution, and was restored to its place in the Union. In 1863, the city of Vicksburg, after a long and gallant defence, was forced, by famine, to surrender to General Grant; and Jackson, the capital, was taken, and partially destroyed by the Federals, and some of the finest regions of the state laid waste.

MISSISSIPPI (Indian, *Miche Sepe*, Great River, literally, Father of Waters), a river of the United States of America, the principal river of North America, and, including its chief branch, the Missouri, the longest in the world, rises in the highlands of Minnesota, in a cluster of small lakes, and near the sources of the Red River of the North, and the rivers which flow into Lake Superior, in lat.  $47^{\circ}10'$  n., long.  $94^{\circ}54'$  w. Its sources are 1680 feet above the Gulf of Mexico, into which it enters. Its general course is southerly, with numerous windings, giving it a length of 2986 miles to its mouth, in lat.  $29^{\circ}$  n., long.  $90^{\circ}$  w., from which, to the source of the Missouri, is 4506 miles. The M. and its branches drain an area of 1,326,000 square miles. It is navigable to the Falls of St Anthony, 2200 miles, and by smaller boats above the falls; or by the Missouri, 3950 miles, and has 1500 navigable branches, the chief of which are the Red River, 340 miles from its mouth; the Yazoo, 534 miles; the Arkansas, 700 miles; the Ohio, 1053 miles; the Missouri, 1263 miles. The M. River forms a portion of the boundaries of ten states, having the southern part of Minnesota, Iowa, Missouri, Arkansas, and most of Louisiana on the west bank; and Wisconsin, Illinois, Kentucky, Tennessee, and Mississippi on the east. The chief towns situated on its banks are New Orleans, Natchez, Vicksburg, Memphis, St Louis, Quincy, Keokuk, Galena, St Paul. The Upper M., above the junction of the Missouri, flows through a picturesque and beautiful country. The great lower valley is 500 miles long, and from 80 to 60 wide. The delta, through which flow its numerous bayous, is 150 miles wide. The alluvial plain through which the river winds has an area of 81,200 square miles; and the delta, 14,000 square miles, all of which, except a few bluffs, is protected by levees, or embankments, from frequent inundations. The descent of the plain is 320 feet, or 8 inches per mile. The river, at high water, is higher than the plain, and the banks higher than the swamps of the interior. The great floods rise 40 feet above low water at the head of the plain, and 20 feet at New Orleans, and for the whole distance the river averages 3000 feet wide, and is from 75 to 120 deep. There is no apparent increase from the largest branches, and it is estimated that 40 per cent. of the floods are lost in the great marshes. Thousands of acres of land upon the banks are annually carried away by the current, with their growth of timber.

MISSISSIPPI SCHEME. The gigantic commercial scheme commonly known by this name was projected in France by the celebrated John Law (q. v.) of Lanrieton, in 1717, and collapsed in 1720. Its primary object was to develop the resources of the province of Louisiana and the country bordering on the Mississippi, a tract at that time believed to abound in the precious metals. The company was incorporated in August, 1717, under the designation of the *Company of the West*, and started with a capital of 200,000 shares of 500 livres each. They obtained the exclusive privilege of trading to the Mississippi, farming the taxes, and coining money. The prospectus was so inviting, that shares were eagerly bought; and when, in 1719, the company obtained the monopoly of trading to the East Indies, China, the South Seas, and all the possessions of the French East India Company, the brilliant vision opened up to the public gaze was irresistible. The *Company of the Indies*, as it was now called, created 50,000 additional shares, but a rage for speculation had seized all classes, and there were at least 500,000 applicants for the

new shares, which consequently rose to an enormous premium. Law, as director-general, promised an annual dividend of 200 livres per share, which, as the shares were paid for in the depreciated *billets d'état*, amounted to an annual return of 120 per cent. The public enthusiasm now rose to absolute frenzy, and Law's house, and the street in front of it, were daily crowded with applicants of both sexes and of all ranks, who were content to wait for hours, nay, for days together, in order to obtain an interview with the modern Plutus. While confidence lasted, a factitious impulse was given to trade in Paris; the value of manufactures was increased fourfold, and the demand far exceeded the supply. The population is said to have been increased by hundreds of thousands, many of whom were glad to take shelter in garrets, kitchens, and stables. But the regent had meanwhile caused the paper circulation of the national bank to be increased as the M. S. stock rose in value, and many wary speculators, foreseeing a crisis, had secretly converted their paper and shares into gold, which they transmitted to England or Belgium for security. The increasing scarcity of gold and silver becoming felt, a general run was made on the bank. The M. S. stock now fell considerably, and despite sundry desperate efforts, which were attended with momentary success, to keep up its credit, it continued to fall steadily and rapidly. In February 1720, the National Bank and the Company of the Indies were amalgamated, but though this gave an upward turn to the share-market, it failed to put the public credit on a sound basis. Several useless attempts were made to mend matters; and those suspected of having more than a limited amount (fixed by a law passed at the time) of gold and silver in their possession, or of having removed it from the country, were punished with the utmost rigor. The crisis came at last. In July 1720, the bank stopped payment, and Law was compelled to flee the country. A share in the M. S. now with difficulty brought twenty-four livres. An examination into the state of the accounts of the company was ordered by government; much of the paper in circulation was cancelled; and the rest was converted into "rentes" at an enormous sacrifice.

MISSIVE, in Scotch Law, is a memorandum. See MINUTE; LETTERS.

MISSOLO'NGHI, also Mesolonghi, a small town of Greece, in the government of Etolia, on the northern shore of the Gulf of Patras, 24 miles west of Lepanto. It is chiefly memorable for the two sieges which it underwent during the war of independence in the early part of the present century. In 1822, it was invested by land and sea by the Turks, who, after a siege of two months, were compelled to withdraw. In 1826, it was again besieged by an overwhelming Ottoman force; and after ten months of resistance and suffering, its garrison, reduced from 5000 to 2000 fighting-men, cut their way through the ranks of the enemy, carrying with them a great number of the women and children. The Turks then entered the town, which was all but totally destroyed. Here Lord Byron died in 1824. Pop. about 4000.

MISSOURI, one of the United States of America, in lat. 36° 30'—40° 30' n., and long. 89° 2'—95° 52' w., being 277 miles from north to south, and from 200 to 312 miles from east to west, having an area of 67,880 square miles, or 43,123,200 acres. It is bounded n. by Iowa; e. by the Mississippi River; s. by Arkansas; and w. by Nebraska Territory, Kansas, and the Indian Territory. M. has 114 counties. Its chief towns are Jefferson City (the capital), St Louis, Kansas City, Hannibal, St Joseph, Lexington. Its chief rivers are the Mississippi, which borders the state for 470 miles; the Missouri, which forms a portion of its western boundary, and passes through it from west to east; and its affluents, the Osage, Gasconade, &c. The country south of the Missouri River is undulating, rising into mountains toward the borders of Arkansas; the northern portion of the state is level prairie-land, with rich bottoms, and high picturesque bluffs on the rivers. The geological formations range between the Lower Silurian and Upper Coal. There are porphyritic rocks in the south; in the centre, coal-measures, with veins of an aggregate thickness of 500 feet, highly bituminous, and immense deposits of iron, with lead and iron in limestone formations. The winters are long and severe, the summers hot, with sudden changes. Much of the land is very fertile, producing maize, wheat, hemp, tobacco, the peach, nectarine, grape, &c. Cotton is grown in the southern counties. A large German population has introduced wine-making. The chief manufactures are ironworks, distilleries, and breweries.

**Missouri**  
**Miyakahara**

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St. Louis has a large trade, and the western towns supply caravans or trains to New Mexico, Utah, and California. The counties and cities have appropriated \$45,000,000 to railways, and in 1875 there were 3036 miles completed, and several hundred under construction. There are 39 universities and colleges, several medical and ecclesiastical seminaries, 8000 public schools with 370,000 pupils, and above 2000 churches. M. was formerly a part of Upper Louisiana. St. Genevieve was settled in 1753, by emigrants from Canada and Spain. St. Louis, a French trading-post, in 1775, had 800 inhabitants. The country was purchased by President Jefferson in 1803; and in 1821, after a great contest, was admitted into the Union as a slave state, under what was called the Missouri Compromise, which admitted M., but prohibited slavery north of the northern boundary of Arkansas, 36° 30' n. lat. In 1861, M. joined with the Seceded States, and became a scene of civil war and violent partisan conflicts. Pop. in 1820, 66,586; and in 1840, 383,702; in 1860, 1,182,817; in 1870, 1,716,000; in 1880, 2,168,380.

**MISSOURI** (Mud River), a river of the United States of America, and chief affluent of the Mississippi, rises in two forks, the Jefferson and Gallatin, in the Rocky Mountains, Dakota Territory, lat. 45° n., long. about 112° w. Its course is first northerly for 500 miles, then easterly 1200, then south-easterly to the mouth of the Kansas, and easterly to its junction with the Mississippi. Its length from its source to the Mississippi is 3096 miles; to the Gulf of Mexico, 4506. It is navigable at high water to the Great Falls, 2540 miles from the Mississippi. It is a turbid, rapid stream, with a vast number of tributaries, the chief of which are the Osage, the Kansas, the Platte, the Cheyenne, the Yellowstone. The Upper M. is remarkable for its scenery; at 411 miles from its source, it enters the Gates of the Rocky Mountains, a gorge of 5½ miles, between perpendicular walls 1200 feet high, and 450 feet apart. At the Great Falls, 145 miles below, the river falls 357 feet in a series of rapids and cascades, 16½ miles long. The largest fall is 87 feet, and the scenery is full of grandeur.

**MISTAKE** is a ground in law for having a contract reformed, and may be set up in some cases as a defence; but a mere mistake as to the legal effect of a deed or contract is in general not regarded as a ground for redress. When money has been paid by a mistake as to some important fact, it may be recovered back from the party to whom it was so paid by an action for money had and received; but if the mistake was made in a matter of law, it cannot be recovered back.

**MISTLETOE** (Anglo-Sax. *mistletoe*, Ger. *mistel*; the *tan* of the Anglo-Saxon name means a twig or prong, a shoot of a tree; *mistel* is cf. uncertain etymology, but probably the same, in meaning at least, as the Latin *viscus*), a genus (*Viscum*) of small parasitical shrubs of the natural order *Loranthaceae*. This order is exogenous, and contains more than 400 known species, mostly tropical and parasitic. The leaves are entire, almost nerveless, thick and fleshy, and without stipules. The flowers of many species are showy. The calyx arises from a tube or rim, which sometimes assumes the appearance of a calyx, and is so regarded by many botanists; what others deem the colored calyx being viewed by them as a corolla of 4 or 8 petals or segments. Within this are the stamens, as numerous as its divisions, and opposite to them. The ovary is one-celled, with a solitary ovule; the fruit one-seeded, generally succulent.—The only British species of this order is the Common M. (*V. album*), a native also of the greater part of Europe, growing on many kinds of trees, particularly on the apple, and others botanically allied to it, as the pear, service, and hawthorn; sometimes, also, on sycamores, limes, poplars, locust-trees, and fir, but very rarely on oaks (contrary to the common belief). It is very plentiful in some parts of the south of England, its evergreen leaves giving a peculiar appearance to the orchards in winter, when the bushes of M. are very conspicuous among the naked branches of the trees; but it is very local. It is not a native of Scotland, though found naturalised in various places. The stems are *dichotomous* (i. e., divide by forking); the leaves are opposite, of a yellowish-green color, obovate-lanceolate, obtuse. The flowers are inconspicuous, and grow in small heads at the ends and in the divisions of the branches, the male and female flowers on separate plants. The berries are about the size of currants, white, translucent, and full of a very viscid juice, which serves to attach the seeds to branches, where they take root when they germinate, the radicle always turning

towards the branch, whether on its upper or under side. The M. derives its nourishment from the living tissue of the tree on which it grows, and from which it seems to spring as if it were one of its own branches. The berries are a favorite food of thrushes. Bird-lime is made from them and from the bark. The M. was intimately connected with many of the superstitions of the ancient Germans and of the British Druids. In the northern mythology, Balder is said to have been slain with a spear of mistletoe. Among the Celts, the M. which grew on the oak was in peculiar esteem for magical virtues. Traces of the ancient regard for the M. still remain in some old English and German customs, as kissing under the M. at Christmas. The M. was at one time in high repute as a remedy for epilepsy and convulsions, but it seems to possess no decided medicinal properties.—*Loranthus Europæus*, a shrub very similar to the M., but with flowers in racemes, is plentiful in some parts of the south of Europe, and very frequently grows on oaks.—*L. odoratus*, a Nepalese species, has very fragrant flowers.

**MISTRAL**, *Mistraou*, or *Maestral*, the Provencal designation of the *Caurus* or *Corse* of the Romans, is a north-west wind which at certain seasons of the year prevails on the south coast of France. Its approach is heralded by a sudden change of the temperature, from the most genial warmth to piercing cold; the air is felt to be purer, and more easily inhaled, the azure of the sky is undimmed by cloud, and the stars shine by night with extraordinary and sparkling brightness; this last appearance is an infallible prognostic. The Mistral then comes in sudden gusts, struggling with the local aerial currents, but its fast increasing violence soon overcomes all opposition. In a few hours it has dried up the soil, dispersed the vapors of the atmosphere, and raised a dangerous tumult among the waters of the Mediterranean. The Mistral blows with its greatest force from the end of autumn to the beginning spring, and causes much damage to the fruit-trees in blossom, and often to the field-crops. It is a terror to the mariners of the gulfs of Lyon and Valence, and even the most hardy seaman makes all haste to a harbor of refuge. The most probable cause of the Mistral is the derangement of atmospheric equilibrium produced by the cold condensed air of the Alps and Cevennes rushing in to supply the vacuum produced by the expansion of the air in the warm southern provinces of France, and on the surface of the Mediterranean. This wind is very appropriately denominated by the Italians *Maestro*.

**MISTRETTA**, a town of the island of Sicily, 67 miles west-south-west of Messina, capital of a district. Pop. (1871) 11,218. It occupies a healthy situation near the northern coast, in the vicinity of the river Nebroden.

**MITAKSHARĀ** is the name of several commentatorial works in Sanscrit, for instance, of a commentary on the text book of the Vedānta philosophy, of a commentary on the *Mīmāṃsā* work of Kumārila, of a commentary on the *Brīhadāraṇyaka* (see *VEDA*), &c. The most renowned work, however, bearing this title is a detailed commentary by Vijnānes'wara (also called Vijnānānūtha), on the law-book of Yājñavalkya (q. v.); and its authority and influence are so great that "it is received in all the schools of Hindu law from Benares to the southern extremity of the peninsula of India as the chief groundwork of the doctrines which they follow, and as an authority from which they rarely dissent" (cf. two treatises on the Hindu Law of inheritance, translated by H. T. Colebrooke, Calcutta, 1810). Most of the other renowned law-books of recent date, such as the *Smṛiti-Chandrikā*, which prevails in the south of India, the *Chintāmanī*, *Vṛamitrodaya*, and *Mayākha*, which are authoritative severally in Mithilā, Benares, and with the *Mahrattas*, generally defer to the decisions of the M.; the *Dāyabhāga* of Jimātāvāhana alone, which is adopted by the Bengal school, differs on almost every disputed point from the M., and does not acknowledge its authority. The M., following the arrangement of its text-work, the code of Yājñavalkya, treats in its first part of duties in general; in its second, of private and administrative law; in its third, of purification, penance, devotion, and so forth; but, since it frequently quotes other legislators, expounding their texts, and contrasting them with those of Yājñavalkya, it is not merely a commentary, but supplies the place of a regular digest. The text of the M. has been edited several times in India. An excellent translation of its chapter "On Inheritance" was published by Colebrooke in the work above referred to; and its explanation of Yājñavalkya is followed by the same celebrated scholar in his "Digest



of Hindu Law" (3 vols. Calcutta and London, 1801), when translating passages from this ancient author.

MITE, a name sometimes given to the *Acarides* generally (see ACARUS); sometimes only to those of them which have the feet formed for walking, and the mouth not furnished with a sucker formed of lancet-like plates, as in the Ticks (q. v.), but with mandibles. All of them are small creatures; the species are very numerous; they feed chiefly on decaying animal and vegetable substances, or are parasitical on quadrupeds, birds, and insects. The CHEESE M. (*Acarus domesticus*, see article ACARUS) is one of the best known species; another is the FLOUR M. (*A. farinæ*), too common among flour, in both of which the body is covered with hairs very large in proportion to its size, and capable of a considerable amount of motion. The SUGAR M. (*A. saccharinus*) swarms in almost all soft sugar; but refined and crystallised sugar seems to defy its mandibles, and is free of it. The surface of jelly and preserves, when it has begun to become dry, is often covered with multitudes of very small mites. A species of M. is the cause of Itch (q. v.); and many of the lower animals are infested by parasites of this tribe. Beetles may often be seen absolutely loaded by a species which preys on them; and bird-fauclers regard with the utmost horror the RED M., which lurks in crevices of cages and aviaries, and sucks the blood, and eats the feathers of their inmates.

MITFORD, Mary Russell, a well-known English authoress, was the only child of a physician, and was born at Alresford, Hants, December 16, 1756. At the age of ten, she was sent to a boarding-school at Chelsea, and also placed under the guidance and tuition of a Miss Rowden, a lady of a literary turn, who had already educated Lady Caroline Lamb, and was destined to be the instructress of Miss Landon and of Fanny Kemble. During the five years she spent here, she read with avidity, studying the tragic authors of France, Shakspeare, and the early dramatists of England. At the age of fifteen, she returned home, and before she was twenty, she published three volumes of poetry. These having been severely castigated by the "Quarterly Review," she applied herself to writing tales and sketches for the magazines. The profession she had adopted from taste she was obliged to continue from necessity, for the spendthrift habits of her father, a good-natured but careless gentleman, had exhausted a competent fortune, and left him dependent on his daughter. The first volume of "Our Village" appeared in 1824, and the series of five volumes was completed in 1832. Of the more important of her dramatic works, "Julian" was first performed in 1823; the "Foscari" in 1826; and "Rienzi" in 1828—all of them, and especially the last, with success. Among her other important works, are "Recollections of a Literary Life" (3 vols. 1852); "Atherton" (a novel, 3 vols. 1854) and other tales; and in 1864, she also published a collected edition of her Dramatic Works, in two volumes. In 1838, she received a pension from government, but neither this nor the growing ill-health of her later years, induced her to relax her literary industry. She died at her residence, Swallowfield Cottage, near Reading, January 10, 1855.

Successful both as a compiler and an author, Miss M. has produced many interesting volumes; but her fame—if the admiring respect for an amiable lady and a woman of graceful literary genius may be so called—rests chiefly on the sketches of country life which compose "Our Village." These sketches are chiefly memorable for their style, which, if not witty, is vivacious, genial, and humorous; the outcome at once of a good heart, an active brain, and a fine fancy.

MITFORD, William, was born in London, February 10, 1744, and studied at Queen's College, Oxford, but left the university without taking his degree. In 1761, he succeeded to the family estate; and in 1769, became a captain in the South Hampshire Militia, in which capacity he made the acquaintance of Gibbon, then a major of the same, by whose advice and encouragement he was induced to undertake a history of Greece. M.'s first work, entitled "An Inquiry into the Principles of Harmony in Languages, and of the Mechanism of Verse, Modern and Ancient," appeared in 1774; but by far his most important publication was his "History of Greece," the first volume of which appeared in 1784, and the last in 1818. It is a pugnacious, opinionative, one-sided, and even fanatical production. The author is an intense hater of democracy, and can see in Philip of Macedon nothing but a great statesman, and in Demosthenes, nothing but an oratorical demagogue. Yet his zeal, which so often led him astray, also urged him, for the very purpose of sub-

stantiating his views, to search more minutely and critically than his predecessors into certain portions of Greek history, and the consequence was that M.'s work held the highest place in the opinion of scholars until the appearance of Thirlwall and Grote. He died February 8, 1827.

**MITHRAS** (cf. Sanscrit *Mitram*, friend), the highest of the twenty-eight second-class divinities of the ancient Persian Pantheon, the *Ized* (Zend. *Yazata*) or Genius of the Sun, and ruler of the universe. Protector and supporter of man in this life, he watches over his soul in the next, defending it against the impure spirits, and transferring it into the realm of eternal bliss. He is all-seeing and all-hearing, and, armed with a club—his weapon against Ahriman and the evil *Devas*—he unceasingly "runs his course" between heaven and earth. The ancient monuments represent him as a beautiful youth, dressed in Phrygian garb, kneeling upon an ox, into whose neck he plunges a knife; several minor, varying, allegorical emblems of the sun and his course, surrounding the group. At times, he is also represented as a lion, or the head of a lion. The most important of his many festivals was his birthday, celebrated on the 25th of December, the day subsequently fixed—against all evidence—as the birthday of Christ. The worship of M. early found its way into Rome, and the mysteries of M. (*Hierogasteria*, *Coracias Sacra*), which fell in the spring equinox, were famous even among the many Roman festivals. The ceremonies observed in the initiation to these mysteries—symbolical of the struggle between Ahriman and Ormuzd (the Good and the Evil)—were of the most extraordinary and to a certain degree even dangerous character. Baptism and the partaking of a mystical liquid, consisting of flour and water, to be drunk with the utterance of sacred formulas, were among the inaugural acts. The seven degrees—according to the number of the planets—were, 1. Soldiers: 2. Lions (in the case of men), or Hyenas (in that of women): 3. Ravens: 4. Degree of *Peres*: 5. of *Oromios*: 6. of *Helios*: 7. of Fathers—the highest—who were also called Eagles and Hawks. At first, of a merry character—thus the king of Persia was allowed to get drunk only on the Feast of the Mysteries—the solemnities gradually assumed a severe and rigorous aspect. From Persia, the cultus of M. and the mysteries were imported into Asia Minor, Syria, Palestine, &c., and it is not unlikely that in some parts human sacrifices were connected with this worship. Through Rome, where this worship, after many vain endeavors, was finally suppressed in 378 A.D., it may be presumed that it found its way into the west and north of Europe; and many tokens of its former existence in Germany, for instance, are still to be found, such as the M. monuments at Heddernheim, near Frankfurt-on-the-Maine, and at other places. Among the chief authorities on this subject are Anquetil da Perron, Crenzer, Silvestre de Sacy, Lajard, O. Müller (*Denkmäler d. alten Kunst*). See GUERRES, PARSES, ZENDAVESTA.

**MITHRIDATES** (more properly, **MITHRADATES**, a name formed from the Persian *Mithras*, or *Mithra*, "the sun," and an Aryan root *da*, to give; hence "sun-given" or "sun-born" prince), the name of several kings of Pontus, Armenia, Commagene, Parthia, and the Bosphorus, all of whom have sunk into insignificance, with the exception of M. VI. of Pontus, surnamed **EUPATOR** and **DIONYSUS**, but more generally known as M. **THE GREAT**. Little is known of his early career. He succeeded his father, probably about 130 B.C., while under 13 years of age, and soon after subdued the tribes who bordered on the Euxine, as far as the Chersonesus Taurica (Crimea), and after the death of Parysatis, incorporated the kingdom of the Bosphorus with his dominions. The jealous behavior of the Romans, and the promptings of his own ambitious spirit, now incited him to invade Cappadocia and Bithynia, but a wholesome fear of the power of the Great Republic induced him to restore his conquests. The *First Mithridatic War* was commenced by the king of Bithynia (88 B.C.), who, at the instigation of the Romans, invaded Pontus. M. sent an ambassador to Rome to complain of this treatment, but he was sent back with an evasive reply. M. immediately commenced hostilities, and his generals repeatedly defeated the Asiatic levies of the Romans, and he himself took possession of Bithynia, Cappadocia, Phrygia, and the Roman possessions in Asia Minor, the inhabitants of which last hailed him as a deliverer. By his orders, a great massacre of the Romans took place, in which, according to one account, 80,000, and according to another, 150,000 were slain. He also sent three pow-

Mitre  
M.tylene

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erful armies to aid the Greeks in their rebellion, but the disastrous battles of Chimeronea and Orchomenus broke his power in that country. He was, however, driven from Pergamus (85 B.C.) by Flavius Fimbria, and reduced to the necessity of making peace with Sulla, relinquishing all his conquests in Asia, giving up 70 war-galleys to the Romans, and paying 2000 talents. The wanton aggressions of Murena, the Roman legate, gave rise to the *Second Mithridatic War*, in 83 B.C. M. was wholly successful in this war, but peace was concluded on the *status quo*, 81 B.C. M. felt, however, that this was merely a truce, and lost no time in preparing for a third contest, in alliance with Tigranes, king of Armenia, the next most powerful monarch of Asia. Tigranes seized Cappadocia, 76 B.C., and M., in the following year, invaded Bithynia, commencing the *Third Mithridatic War*. M. formed an alliance with Sertorius (q. v.), and obtained the services of Roman officers of the Marian party, who trained his army after the Roman manner. The arms of M. were at first successful; but afterwards the Roman consul Lucullus (q. v.) compelled him to take refuge with Tigranes, 72 B.C. Lucullus then conquered Pontus, defeated Tigranes, 69 B.C., at Tigranocerta, and both Tigranes and M. at Artaxata, 68 B.C. M., however, recovered possession of Pontus. After the war had lingered for some time, Cneius Pompeius (see POMPEY), completed the work of Lucullus, 66 B.C., defeating M. on the Euphrates, and compelling him to flee to the Boeporus. Here his indomitable spirit prompted him to form a new scheme of vengeance, which was, however, frustrated by the rebellion of his son, Pharnaces, who besieged him in Panticapæum. Deeming his cause hopeless, M. put an end to his own life, 63 B.C. M. was a specimen of the true eastern despot, but he possessed great ability, and extraordinary energy and perseverance. His want of success was owing not to his defects as a general, but to the impossibility of raising and training an army capable of coping with the Roman legions, and his system of tactics during the third Mithridatic war, plainly shows his thorough conviction of this fact. He had received a Greek education at Sinope, could speak no less than 25 different languages and dialects, and possessed considerable love for the arts, of which his magnificent collection of pictures, statues, and engraved gems were a proof. In the estimation of the Romans, he was the most formidable opponent they ever encountered, and occasional reports of his various successes spread the utmost terror among them.

**MITRE**, the point or line of union of mouldings meeting at an angle.

**MITRE** (Lat. *mitra*, also *infula*), the head-dress worn in solemn church services by bishops, abbots, and certain other prelates in the Western Church. The name, as probably the ornament itself, is borrowed from the orientals, although, in its present form, it is not in use in the Greek Church, or in any other of the churches of the various eastern rites. The western mitre is a tall, tongue-shaped cap, terminating in a twofold point, which is supposed to symbolise the "cloven tongues," in the form of which the Holy Ghost was imparted to the apostles, and is furnished with two flaps, which fall behind over the shoulders. Opinion is much divided as to the date at which the mitre first came into use. Eusebius, Gregory of Nazianzus, Epiphanius, and others speak of an ornamented head-dress, worn in the church; but there is no very early monument or pictorial representation which exhibits any head-covering at all resembling the modern mitre. From the 9th c., however, it is found in use, although not universally; and instances are recorded in which the popes grant permission to certain bishops to wear the mitre; as, for example, Leo IV. to Anscar, Bishop of Hamburg, in the 9th century. The material used in the manufacture of the mitre is very various, often consisting of most costly stuffs, studded with gold and precious stones. The color and material differ according to the festival or the service in which the mitre is used, and there is a special prayer in the consecration service of bishops, used in investing the new bishop with his mitre. The mitre of the pope is of peculiar form, and is called by the name *Tiara* (q. v.). Although the mitre properly belongs to bishops only, its use is also permitted by special privilege to certain abbots, to provosts of some distinguished cathedral chapters, and to a few other dignitaries. See Binterim, "Denkwürdigkeiten der Kirche," 1 B. 2 Th., p. 343.

The mitre, as an ornament, seems to have descended in the earliest times from bishop to bishop. Among the Cottonian MSS., is an order, dated 1st July, 4 Henry

VL, for the delivery to Archbishop Chicheley of the mitre which had been worn by his predecessor. It was in some cases a very costly ornament. Archbishop Pechiam's new mitre, in 1288, cost £173, 4s. 1d. In England, since the Reformation, the mitre is no longer a part of the episcopal costume, but it is placed over the shield of an archbishop or bishop, instead of a crest. The mitre of a bishop has its lower rim surrounded with a fillet of gold; but the Archbishops of Canterbury and York are in the practice of encircling theirs with a ducal coronet, a usage of late date and doubtful propriety. The Bishop of Durham surrounds his mitre with an earl's coronet, in consequence of being titular Count Palatine of Durham, and Earl of Sedburgh. Before the custom was introduced of bishops impaling the insignia of their sees with their family arms, they sometimes differenced their paternal coat by the addition of a mitre. Mitres are rare as a charge in heraldry, but are sometimes borne as a crest, particularly in Germany, to indicate that the bearers were feudatories, or dependencies of ancient abbeys.

**MITSCHERLICH**, Eilhard, a distinguished Prussian chemist, was born at Neneude, near Jena, in 1794, and died at Berlin in 1863. In 1811, he proceeded to the university of Heidelberg, where he devoted himself to history, philology, and oriental languages; and he continued the study of these subjects at Paris and Göttingen. It seems to have been at the last-named university that (1814 or 1815) he first turned his attention to geology and mineralogy, chemistry and physics, and it was not till 1818, when he was at Berlin, that he selected chemistry as his special study. His observations on the striking similarity between the crystalline form and the chemical composition of the arseniates and the phosphates, led to his discovery of the law of Isomorphism (q. v.), the importance of which was so fully recognised by Berzelius, that he invited the young chemist, in 1819, to Stockholm, where he studied till 1821, when, on the death of Klaproth, he was, on the strong recommendation of Berzelius, appointed to the vacant chair of chemistry at Berlin. One of his earliest discoveries after his appointment was that of the double crystalline form of sulphur, the first observed case of Dimorphism. See *DIMORPHISM*. His investigations regarding the formation of artificial minerals, and his memoirs on Beuzine and on the Formation of Ether must be classed amongst his most important contributions to chemistry; but it is mainly on the discovery of Isomorphism and Dimorphism that his reputation will finally rest. His principal work is his "*Lehrbuch der Chemie*," begun in 1829, and concluded in 1841. It has passed through five editions, and is especially valuable for the clear and simple way in which he has brought mathematics and physics to bear upon the subject. He was an honorary member of almost all the great scientific societies, and received the gold medal from the Royal Society of London for his discovery of the law of Isomorphism.

**MITTAU**, or Mitau, the chief town of the government of Courland, in European Russia, is situated on the right bank of the Aa, 25 miles south-west of Riga, and was founded in 1211 by the grand master of the Teutonic Knights. It was annexed to Russia in 1795. Pop. (1867) 28,100, the majority of whom are Germans by birth or descent, 1000 are Jews, and only a few Russians. The town is indifferently built, the houses being chiefly of wood, and painted of a green or brown color. The most important buildings are the old castle—now the seat of the governor of the province—four churches, an astronomical observatory, a public library, a museum, and a number of educational and charitable institutions. As regards commerce and industry, the town occupies only the third place in the government, its principal product being articles of japanned iron and tin; there is an export trade in hemp, flax, and corn. M. is the winter residence of the gentry of the surrounding country, and was for some time the abode of Louis XVIII.

**MITTIMUS**, an English law-term for a writ by which a record is transferred out of one court into another.

**MITTWEIDA**, a town of Saxony, in the circle of Zwickau, 35 miles south-east of Leipzig. For centuries, M. has been noted for its industry. The principal branches of industry are spinning, cotton-weaving, manufacture of fustian, &c., together with dyeworks and bleach-fields. Pop. (1875) 9093.

**MITYLENE**. See *LEZBOS*.

**MIXED MARRIAGES.** In various countries of Europe, marriages between persons of different religious belief have either been prohibited or put under restrictions. The canon law forbade marriages between Christians and non-Christians; at one time, it merely discouraged, at another altogether prohibited the marriage of orthodox Christians with heretics. Subsequently to the Reformation, papal dispensations were in use to be granted for marriages between Catholics and Protestants, with the condition annexed, that the children should be brought up in the Catholic faith. During the latter part of the 17th c., parents seem to have been left at liberty to make what agreement they pleased on this head; and in default of their making any, it was presumed that the children would follow the religion of their father. In the middle of the 18th c., the validity of mixed marriages, even when celebrated by the civil magistrate, was recognised by the papal court; and under Napoleon's rule, they became common, without stipulations as to the children. The events of 1815 restored sufficient influence to the Roman Catholic Church, to enable the clergy to put in force a rule by which they could refuse to celebrate such marriages without an assurance that the children would be brought up Catholics. By a law of many of the German states, the clergymen of the bride was the only person who could competently officiate, and an engagement of this kind was often not only repugnant to the father as a Protestant, but illegal. Conflicts followed between the civil and ecclesiastical authorities, which have sometimes been obviated by the priest, on whom the law imposes the celebration of the marriage, not pronouncing the nuptial benediction, but giving his presence as a witness along with two other witnesses when the parties declared themselves husband and wife—a kind of marriage whose validity is perfectly recognised by the canon law. In Spain, marriages between Catholics and Protestants have sometimes taken place in this way, avoiding the stipulations otherwise necessary regarding the children.

There was, till lately, a great diversity in the state of the law of mixed marriages in different parts of Germany. Prussia was the first state to do away the former restrictions by the recognition of a civil ceremony alone as that which constitutes marriage in the eye of the law. Until that change, the letter of the law provided that the children should be brought up in the faith of their father, and no compacts to the contrary were allowed. Practically, however, the law was largely evaded, no one having a recognised interest to object to the fulfilment of such agreements. In Bavaria, mixed marriages might be performed either by Protestant or Catholic clergymen; and the spouses had it in their power to make what arrangements they pleased regarding the children before or after marriage; but if no such arrangements happened to have been made, the children were brought up in the religion of their father. In Saxony, and various other German states, the spouses might, before marriage, make what arrangements they liked as to the religion of their children; but if they had made none, the law obliged them to be brought up in the faith of their father. A bill for rendering civil marriage obligatory throughout the empire was brought before the Reichstag in 1874, and passed in 1875, thus extending the system of Prussia to all other German states. This bill enables men and women to be married independently of the consent of the clergy (not always easily obtained in Catholic districts), or of the difference of their religious beliefs. It also allows of children being left unbaptised, and brought up without being assigned to any religious denomination whatsoever. In Austria, the interposition of the Catholic priest is required in marriages between Catholics and Protestants. He need not, however, give the sacerdotal benediction; his passive assistance only is required, either in taking the declaration of the parties, which is followed by a Protestant ceremony, or by being present as a witness at the Protestant ceremony. When the husband is Catholic, all the children must be brought up Catholic; when the husband is Protestant and the wife Catholic, the sons follow the father and the daughters the mother. In Denmark, stipulations may be made before or after marriage, and can be altered by mutual consent of the parents, or, in some cases, even after the death of one of them. Mixed marriages were, till lately, altogether prohibited in some of the Catholic cantons of Switzerland, but they are now authorized in all the cantons by the federal laws. It is generally the clergyman of the husband's creed who officiates, but at Zürich the ceremony is performed in both churches. In most cases, the children are required to be educated in the religion of their father.

In most German states, marriages between Christians and Jews or Mohammed-

dans used to be interdicted; but after 1849, the prohibitions were in individual cases dispensed with. In Denmark, such marriages have been permitted, on condition of the children being brought up Protestants. In Russia, the members of both Greek and Roman communions are prohibited from intermarrying with non-Christians: members of the orthodox Greek Church cannot marry Greek sectaries; but when an orthodox Russian marries a Protestant or Catholic, the benediction must be given in the Greek Church, and the children baptized in the Greek communion. When the parents are of different religions, but neither belongs to the Greek Church, ante-nuptial stipulations will be given effect to; if none have been made, the sons follow the father's faith, the daughters the mother's.

In France, the law regards marriage as a purely civil contract, and recognises only the civil celebration, which is completely separated from the religious rite. As the faith of the parents is not taken cognizance of, questions regarding the religious education of the children cannot arise before the civil tribunals.

The only restriction to which mixed marriages are now subjected in any part of the United Kingdom is imposed by act 19 Geo. II. c. 13, applicable to Ireland only, that a marriage celebrated by a Catholic priest between a Roman Catholic and a Protestant, or a person who within twelve months has been or professed to be a Protestant, or between two Protestants, is null.

**MIXED RACES.** The subject of *mixed races* is one intimately connected with an enlarged study of ethnology. It involves a consideration of the phenomena attendant upon the sexual union between individuals belonging to different varieties of the human race; as, for instance—adopting the classification of Blumenbach—between the European and the negro or the American Indian; or between the American Indian and the negro; or between any of these three and individuals belonging to the Malay and Mongolian varieties. It is well understood that such unions are in general prolific; and not only so, but that their offspring is likewise prolific; and this fact is much relied upon by some ethnologists, as an argument in favor of the unity of the human race. They reason thus: Were the different varieties of mankind distinct species, as has been frequently alleged, then it would necessarily follow that the offspring of such unions would prove as unfruitful as those between the horse and the ass, the goat and the sheep, the wolf and the dog; and similarly with respect to the hybrids among birds, insects, and plants. To sum up, in the words of Dr Prichard, the best exponent of this school of ethnology: "It seems to be the well-established result of inquiries into the various tribes of organized beings, that the perpetuation of hybrids, whether of plants or animals, so as to produce new and intermediate tribes, is impossible. Now, unless all these observations are erroneous, or capable of some explanation that has not yet been pointed out, they lead, with the strongest force of analogical reasoning, to the conclusion, that a number of different tribes, such as the various races of men, must either be incapable of intermixing their stock, and thus always fated to remain separate from each other, or, if the contrary should be the fact, that all the races to whom the remark applies, are proved by it to belong to the same species." Dr Prichard further observes, that so far from such unions between members of different varieties of the human race proving unfruitful, or their offspring unfruitful, the very opposite is the case, as, for instance, in unions between the negro and the European, the most strongly marked varieties of our race. "If we inquire," he says, "into the facts which relate to the intermixture of negroes and Europeans, it will be impossible to doubt the tendency of the so-called Mulattoes to increase. The men of color, or the mixed race between the Creoles and the negroes, are in many of the West India Islands a rapidly increasing people, and it would be very probable that they will eventually become the permanent masters of those islands, were it not for the great numerical superiority of the genuine negroes. In many parts of America, they are also very numerous." It is to America, indeed, both north and south, that we must chiefly look for the numerous and varied phenomena resulting from this intermixture of races; for there we have not only the negro and the European mingling their blood, but the negro and the American Indian, the European and the Indian, and the offspring of each of these with the offspring of the other, or with members of either of the parent stocks; added to which, of late years, the Chinese (of Mongolian race or variety) have appeared upon the scene, thus contributing greatly to the number of what are termed

*human hybrids*. All these, however, are not equally fertile; and with respect even to the Mulattoes, it is alleged by writers of the Morton school of ethnology that they do not perpetuate themselves for many generations. "Nature," says Squier, rather dogmatically, "perpetuates no human hybrids—as, for instance, a permanent race of Mulattoes." And Dr Nott, adopting the classification of species laid down by Dr Morton—namely, *Remote Species*, in which hybrids are never produced; *Allied Species*, which produce, *inter se*, an infertile offspring; and *Proximate Species*, which produce with each other a fertile offspring—is of opinion that it is only by the union of southern or dark-skinned Europeans with negroes that thoroughly prolific Mulattoes are engendered, which is not the case in unions occurring between individuals of the Anglo-Saxon and negro races. In arriving at this conclusion, we cannot help thinking that the author has been helped forward by the strong prejudice existing in the Southern States against all taint of negro blood. A more impartial writer, Professor Wilson, in his "Prehistoric Man," observes: "There are upwards of four millions of people of African blood in the United States, and certainly not less than ten millions throughout the continent and islands of North and South America, and of these the larger proportion consists of hybrids. . . . It is impossible to determine with certainty how far the hybrid colored population of the United States is capable of permanency, either by the development of a fixed hybrid type, or by continuous fertility, until the predominant primary type reasserts its power, by their return to that of the original white or black parent, so long as the mixed breed is constantly augmented in the Southern States by means at variance with the natural and moral relations of social life." As it is, the weight of evidence appears to be in favor of Dr Prichard's view; but until the doctrine of hybridity is better understood, and a more satisfactory answer to the vexed question, "What is species?" has been supplied to us, we must deem it idle to pronounce dogmatically on the subject. See HYBRID and SPECIES. We conclude with a list of half-castes given by Dr Tschudi, "with a few additions from other sources," printed in the appendix to Professor Wilson's valuable work just mentioned.

Father.	Mother.	Half-caste.
White.....	Negro.....	Mulatto.
White.....	Indian.....	Mestizo.
Indian.....	Negro.....	Chino.
White.....	Mulatta.....	Quarteron.
White.....	Mestiza.....	{ Creole, only distinguished from the white by a pale brown complexion.
White.....	Chinese.....	Chino-blanco.
White.....	Quarterona.....	Quintero.
White.....	Quintera.....	White.
Negro, N. A.....	Indian.....	Zambo or Cariboco.
Negro, S. A.....	Indian.....	Mameluco.
Negro.....	Mulatta.....	Zambo-negro or Cabra.
Negro.....	Mestiza.....	Mulatto-oscuro.
Negro.....	Chinese.....	Zambo-Chino.
Negro.....	Zamba.....	Zambo-negro (perfectly black).
Negro.....	Quarterona.....	Mulatto (rather dark).
Negro.....	Quintera.....	Pardoc.
Indian.....	Mulatta.....	Chino-oscuro.
Indian.....	Mestiza.....	{ Mestizo-claro (frequently very beautiful).
Indian.....	China.....	Chino-cholo.
Indian.....	Zamba.....	Zambo-claro.
Indian.....	China-cholo.....	Indian (with short frizzly hair).
Indian.....	Quarterona.....	Mestizo (rather brown).
Indian.....	Quintera.....	Mestizo.
Mulatto.....	Zamba.....	Zambo.
Mulatto.....	Mestiza.....	{ Chino (of rather clear com- plexion).
Mulatto.....	Chino.....	Chino (rather dark).

**MIXTURES** are officinal preparations, extempore in their nature, some of which—as, for example, *Mistura Camphoræ*, *Mistura Cretæ*, and *Mistura Ferri Composita*—are very extensively used in medical practice, either as vehicles for more active remedies, or for their intrinsic value.

**MIZEN**, or Mizzen, the sternmost of the masts in a three-masted vessel, and also the smallest of the three. Above it are the mizen-topmast, the mizen-topgallant-mast, and the mizen-royal. It supports the usual yards, and, in addition, the gaff and boom of the Spanker (q. v.). A rear-admiral hoists his pendant at the mizen.

Although the word mizen is now applied adjectively to the several parts, it appears formerly to have been the name of a large triangular sail carried in the stern, and thence to have become the distinguishing title of the mast which bore that sail. The name is probably from It. *mezzano*, mean, in the middle; in opposition to a square sail, which lies across the vessel.

**MNEMONICS.** See **MEMORY**.

**MNEMOSYNE**, in Classical Mythology, the goddess of Memory, and the mother of the nine muses (q. v.), whom she bore to Jupiter. The principal seat of her worship was at Eleuthera, in Bœtia.

**MOA**, the name given by the New Zealanders to the large wingless or strnthon birds (see **BREVIPENNES**) of which the bones are found imbedded in the sands of the seashore, in swamps, forests, river-beds, and limestone caves, and of which traditions subsist among them as birds living in their country. The largest bones belong to the genus *Diornis* (q. v.), others to *Palapteryx* (q. v.); and with them are found bones of a large bird (*Aptornis*) resembling a swan, supposed to be now extinct, also of the existing species of *Apteryx* (q. v.) and of *Notornis* (q. v.), much smaller birds. It is generally supposed that no large moas have been seen alive since about 1650; but it has recently been again alleged that some have been seen, and rewards have been offered for the capture of them. They are represented by the New Zealanders as stupid, fat, indolent birds, living in forests, mountain fastnesses, &c., and feeding on vegetable food. Their feet are said to have been adapted for digging. They seem to have been extirpated for the sake of their flesh, feathers, and bones. The eggs were eaten. The leg-bones of the moas were filled with marrow, and not with air, as those of other birds.

**MO'ABITES**, a pastoral people, who inhabited the mountainous country east of the lower part of the Jordan and of the Dead Sea. Their *cultus* was characterised by many very odious rites, among which was human sacrifice. In the time of the Judges, the Jews were for eighteen years under the yoke of the M., who were afterwards made tributary by David, bnt. about 900 B.C., shook off their allegiance to the Jewish kings, and afterwards took part with the Chaldeans against the Jews. Their name no longer exists, and the remnants of the people have long been included among the Arabs.

**MOABITE STONE**, The, a stone bearing a long inscription in Hebrew-Phœnician letters, discovered at Dibân in Moab in 1868. It appears to have been erected by Mesha, king of Moab, mentioned in 2 Kings vii., and the inscription refers to his wars with Israel (in the 10th c. B.C.). The negotiations set on foot for its purchase led to quarrels among the Arab tribes claiming an interest in it, and the memorial was unfortunately broken to pieces. The fragments, however, were, with great difficulty collected, and are now preserved in the LOUVRE.

**MOAT**, the ditch round the ramparts of a fortress, may be either wet—i. e., full of water—or dry. In the latter, which is the commoner case, the depth should not be less than 12 feet, nor the width under 24. The more perpendicular the walls, so much the greater will be the obstruction to the enemy. In regular works, the walls are usually revêted with masonry, that at the foot of the rampart being the scarp or escarp, and that below the covered way the counterscarp. See **DITCH** and **FORTIFICATION**.

**MOBILE**, the principal city and only seaport of Alabama, United States of America, is situated on the west side of Mobile River, and at the head of Mobile Bay, which opens into the Gulf of Mexico. It is built with broad shaded streets on a



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sandy plain, rising gradually from the river, with a fine custom-house and post-office, city hall and market-house, theatre, Odd Fellows' Hall, cathedral, 80 churches, 4 orphan asylums, several hospitals, a medical college, St Joseph's College (a Jesuit institution), a convent of the Visitation, and academy for young ladies. M. has several ship-yards, foundries, and cotton-presses. Its chief business is the export of cotton. The average export for five years preceding the Civil War was 632,303 bales; in 1874-5, 131,342 bales, value 9,054,110 dollars, were exported. There is also a large exportation of turpentine, rosin, and tar. Its harbor is defended by Fort Morgan. M. was settled by the French in 1702. Pop. in 1870, 32,034; 1880, 22,132.

**MOBILE**, a river and bay of Alabama, United States of America. The river is formed by the confluence of the Alabama and Tombigbee, 50 m. above Mobile, which lies at its mouth. It is a sluggish stream, with low banks and several channels. The bay is 30 m. from north to south, and 10 or 12 from e. to w. The entrance from the Gulf of Mexico, 3 m. wide, is defended by Fort Morgan and Fort Gaines.

**MO'BILE**, Mobilis, an adjective and verb, used respectively in regard to continental armies, to designate a state of readiness for taking the field, and the act of making ready for such an operation. The process consists in augmenting a regiment from its peace to its war complement, in calling in men on furlough, in organising the staff of divisions and brigades, constituting the commissariat, medical artillery, and transport services, and in accumulating provisions and munitions. As the work of mobilising an army causes great and inevitable expense, it is only resorted to when hostilities appear imminent.

**MOBILIER, Cr dit.** On the 18th November 1853, the French government sanctioned the statutes of a new bank under the name of the *Soci t  G n rale de Cr dit Mobilier*. The name was intended as a contrast to the *Soci t  de Cr dit Foncier*, which are of the nature of land banks, and advance money on the security of real or immovable property; while the *Cr dit Mobilier* proposed to give similar aid to the owners of movable property. The declared object of this bank is especially to promote industrial enterprises of all kinds, such as the construction of railways, sinking of mines, &c. Various privileges were conferred upon it under its charter; in especial, it was allowed to acquire shares in public companies, and to pay the calls made upon it in respect of such shares, by its own notes or obligations; also to sell or give in security all shares thus acquired. The operations of the society were conducted upon a very extensive scale. In 1854, it subscribed largely to the government loan on account of the Russian War, to the Grand Central Railway Company, to the General Omnibus Company of Paris, and to various other important undertakings. The dividend for this year was 12 per cent. In 1855, it lent two sums to the government—the one of 250, and the other of 375 millions of francs. Its operations were vast during this year, and the dividends declared amounted to 40 per cent. The directors had not hitherto availed themselves of their privilege of issuing their own obligations, but this they now resolved on doing. They proposed to issue two kinds—the one at short dates; the other at long dates, and redeemable by instalments. The proposed issue was to amount to 240 millions of francs, but the public became alarmed at the prospect of so vast an issue of paper-money, so that, in March 1856, the French government deemed it necessary to prohibit the carrying out of the proposed scheme. This was a severe blow to the institution. In 1856, its dividends did not exceed 22 per cent.; in 1857, they were only 5 per cent.; in 1860, they were 10 per cent. In 1867, stock fell greatly, and the company had to go into liquidation. The managers, however, retired with large fortunes. The shares are 500 francs, and the market price in January 1876 was 194 francs. The *Cr dit Mobilier* has undoubtedly been highly useful in developing the industrial power of France, but its operations have been hazardous, and had they not been checked in time, they would in all probability have ended in disaster.

**MO'CHA**, the most strongly fortified seaport, and once the capital, of the province of Yemen, in Arabia. It is situated on the Red Sea, at the head of a little bay near the Strait of Bab-el-Mandeb, and 130 miles west-north-west of Aden (q. v.). All round the shore is a hot sandy waste. The principal trade is in coffee, of which 10,000 tons (of the finest quality) are annually exported to Jiddah, Suez, and Bombay. Other exports are dates, gums, balm, ivory, senna, &c. Pop. 5000.

**MOCHA STONES** are pieces of agate or of chalcedony, containing dendritic infiltrations, often assuming appearances very like finely ramified confervæ, &c. They receive the name Mocha Stone because, when they first became known in Europe, they were brought from Mocha. Of the same nature with M. S. are *Moss Agates*. The resemblance of the enclosed infiltrations to plants is often merely accidental, but it appears to be sometimes really due to plants, which were enclosed in the cavity in which the silicious mineral itself was formed.

**MOCKING-BIRD**, or Mocking-Thrush (*Mimus* or *Orpheus*), a genus of birds of the family *Merulide*, having a more elongated form than the true thrushes, a longer tail, shorter wings, and the upper mandible more curved at the tip. They are all American. The best known species, the M. of the United States (*M. polyglottus*), is about the size of the song-thrush; the upper parts of a dark brownish ash color, the wings and tail nearly black, the under parts brownish white. The M. is common in almost all parts of America, from the south of New England to Brazil; north of the Delaware, it is only a summer visitant, but in more southern regions it is found at all seasons. It is one of the most common birds of the West Indies, and its exquisite song fills their groves with melody by night, for which reason it is there very generally known as the Nightingale. By day, the M. is generally imitative, excelling all birds in its power of imitation, now taking up the song of one bird, and now of another, and often deceiving the most practised ear by its perfect performance. By night, its song is for the most part natural. It does not confound itself, however, to musical strains; it seems to take equal pleasure in repeating the harshest cries of the feathered tribes; and in domestication readily adds to its accomplishments the imitation of almost any sound which it is accustomed to hear, passing from one to another with great rapidity, so as to produce an incomparable medley. The M. readily learns to whistle a tune, even of considerable length, but there is no well authenticated instance of its imitating the human voice. The barking of a dog, the mewling of a cat, the crowing of a cock, the cackling of a hen, the creaking of a wheel-barrow, are all within the compass of its powers. During its performances, it spreads its wings, expands its tail, and throws itself about, as if full of enthusiasm and enjoyment. The M. is vocal at all seasons of the year. It enjoys almost everywhere the protection of man, and often makes its nest in a tree or bush close beside a house. Two or three broods are produced in a year. The male is extremely attentive to his mate, and manifests extraordinary courage in driving away enemies from the nest. Mocking-birds often assemble on such occasions, and birds of prey, far superior to them in size and strength, are compelled to retreat. Snakes are killed by reiterated blows on the head, and cats learn to consider the vicinity of a mocking-bird's nest unsafe. The food of the M. consists chiefly of berries and insects. Another species of M. is found in the Rocky Mountains, and species of the same genus are among the finest song-birds of the temperate parts of South America.

**MODE**, in Music. Every musical passage is referrible to and forms part of a succession of sounds having some appreciable relation to one another. This succession of sounds is called the Scale, and is a series of steps leading from a given note called the Key-note, or Tonic (q. v.), to its octave. The steps or degrees of the scale are of unequal size, and on the place of the smaller ones or semitones depends the mode of the music. Taking our natural scale, there are only two notes in it which can satisfy the ear as key-notes—viz., C and A. In the major mode, with C as key-note, the semitone or small interval falls between the third and fourth sounds; in the minor mode, with A as key-note, it falls between the second and third sounds; in the former case, the third of the key-note is a major third, in the latter a minor third. The minor mode further requires to be modified by occasionally sharpening its sixth and seventh, in order to be pleasing to modern ears. The scale of the major mode is derived from simpler harmonic proportions than that of the minor. Melodies composed in the latter mode have generally more or less of a plaintive or melancholy character. For the theory of these modes, see *MUSIC*. Ancient musicians admitted of a greater variety of modes. The Greeks had six, designated the Dorian, Phrygian, Lydian, Mixo-Lydian, Ionic, and Æolian. The Ionic is the modern major, the Æolian the minor mode; the others are more or less intolerable to a modern ear. They are used to a limited extent in the music of the Greek Church, and in the Ambrosian Chant.

Modelling  
Mossia

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**MO'DELLING** is the process of preparing the original pattern or design from which a work in sculpture is to be cast or carved: the technical details will be found under **SCULPTURE**. Modelling is also practised by medallists; the head or figure intended to be cut in the die being first modelled in relief with wax on a piece of slate. Goldsmiths, silversmiths, and jewellers also model intricate and artistic forms and ornaments of pieces of plate, to be cast and chased by them, or in which jewels are to be set. Wax is the substance used when delicacy and minuteness are required. Modelling is also a branch of the potter's trade. Flaxman modelled for Wedgwood numerous figures and groups in wax. For large models, the material employed is potter's clay, which, when used by sculptors, is mixed with a portion of sandstone, finely pulverised to make it work freely.

**MO'DENA** (anc. *Mutina*), capital of the former duchy of same name, a fortified city of Northern Italy, 24 miles west-north-west of Bologna. Pop. (1871) 80,854. It stands between the rivers Secchia and Panaro, in a pleasant plain, noted for its rich soil and salubrious air, and from its surrounding ramparts commands fine views of the Apennines. Although the social life of M. is somewhat stagnant, it is nevertheless a most agreeable city. It lies on the famous Via Emilia (see **EMILIAN PROVINCES**), by which it is divided into the old and new city, and is connected by a navigable canal with the rivers Secchia and Panaro. Amongst the public buildings, may be noted the cathedral of St Geminianus, the patron of the city, a structure of the purely Lombard style. The campanile or belfry is one of the great towers of Italy; it is a square turreted structure, 315 feet in height, its entire façade being in white marble. The ducal palace, a picturesque structure of the 17th c., is adorned with an infinity of galleries, courts, and marble arches; it contains the splendid Biblioteca Estense, numbering 100,000 volumes, and 3000 rare MSS.; also the valuable Este archives, a most important collection of medieval records, collections of coins and medals of great antiquity, and an observatory. Schools of theology, law, medicine, and mathematics have replaced the university, suppressed in 1821; there are also five museums of natural history, a botanic garden, theatres, and good public baths. The trade of M. is unimportant: the manufactured products are confined to linen and woollen fabrics, leather, hats, paper, glass, and pottery, besides silk manufactured to a much less extent than formerly. M. is the birthplace of the great anatomist Fallopius, and the antiquary Sigonio.

The ancient history of M. affords evidence that it enjoyed at an early period a considerable degree of prosperity; the splendor, wealth, and arts of the city of M. being mentioned by Cicero, Pliny, and Strabo. In modern times, M. has shared more or less the various vicissitudes which befell Italy, and participated in the great internecine feuds of the country. In 960, a member of the great House of Este was proclaimed Marquis of Modena, and in 1452 the then reigning marquis was created duke by the Emperor Frederick III. In 1796, M. formed part of the Cisalpine Republic, but was restored in 1814 by the congress of Vienna to the reigning family. The duchy had at that time an area of 2310 square miles, and a population of 636,000. In 1844, the Duke of Modena was temporarily deprived of his rights; and in 1860, the population definitively expelled the unpopular ruler, who carried off all the property and valuables within his reach, including the silver handles of the palace doors. M. is now a province of the kingdom of Italy: area 960 sq. m.; pop. (1871) 278,231.

**MO'DERATOR**, a term used in Scotch ecclesiastical law to describe the chairman or president of a Presbyterian church-court.

**MO'DICA**, the Mohac of the Saracens, a city of the island of Sicily, in the province of Val di Noto, 90 m. from Syracuse. Pop. (1872) 33,169. The city, which stands perched amidst rocks, contains several fine buildings, and, notwithstanding the humidity of the climate, the sanitary condition of the inhabitants seems satisfactory. The soil of the surrounding district is the most productive of Sicily, and yields vast quantities of corn, tobacco, oil, wine, hemp, which, with cheese, wool, soda, and butter, form the chief export trade of the place. The valley of Ispica, or Ispica, in the vicinity of M., contains remarkable rocks, in which numerous dwellings are excavated.

**MOD'ILLION**, an ornamental bracket, much used in classic architecture, especially in the cornices of the Corinthian and Composite styles.

**MODULATION**, in Music. When in the course of a melody the key-note is changed, and the original scale altered by the introduction of a new sharp or flat, such change is called modulation. Much of the pleasure of music is derived from a judicious use of modulation. The art of good modulation from one key to another consists in the proper choice of intermediate chords. Sudden transitions, without intermediate chords, should be employed but sparingly, and in peculiar circumstances. Every piece of music is composed in a particular key, in which it begins and ends, which generally predominates over any other keys that may be introduced in the course of the composition.

**MO'DULE**, in Classic Architecture, an arbitrary measure for determining the proportions of the various members of the orders. The diameter, semi-diameter, or one-third of the diameter are most frequently used; the first being usually divided into 60 parts (or minutes), the second into 30 parts, and the third into 20 parts.

**MODULUS**, a constant coefficient or multiplier; by means of which one series or system of quantities can be reduced to another similar series or system. Thus we have the modulus of Elasticity (q. v.), of Friction (q. v.), and of systems of Logarithms (q. v.). The system of logarithms which is universally accepted as the primary is Napier's, and from it all other systems are deduced in the following manner: Let  $N$  be a number of which the Napierian logarithm is  $b$ ,  $e$  being the Napierian base, it is required to find the logarithm of  $N$  to some other base  $a$ . Let  $x$  be this logarithm, then (see LOGARITHMS)  $N = e^b = a^x$ , and taking the Napierian logarithms of both sides of this equation,  $b \log. e = x \log. a$ , or (since  $\log. e = 1$ )  $b = x \log. a$ ,

therefore  $x = \frac{b}{\log. a}$ ; i. e.,  $\log. a N = \frac{\log. e N}{\log. a} = \frac{1}{\log. a} \times \log. e N$ . This multiplier, or

"modulus,"  $\frac{1}{\log. a}$ , is independent of  $N$ , and is therefore constant for the reduction of all Napierian logarithms to the system whose base is  $a$ . If  $a = 10$ , the multiplier becomes  $\frac{1}{\log. 10}$ , the modulus of Briggs's, or the common system of logarithms, and

is equal to  $\frac{1}{2.30258509} = .4342944 \dots$

**MO'DUS**, in English Law, means a peculiar custom by which lands become exempted from payment of tithes on paying some composition or equivalent.

**MÖEN**, a Danish island in the Baltic Sea, separated from Seeland on the north-west by the *Ulfsund*, and from Falster on the south-west by the *Grönsund*. It is 19 miles long, by about 5 miles in average breadth. Area, 84 square miles. Pop. about 15,000, who are supported by agriculture, fisheries, and commerce. It has been called the Switzerland of Denmark, and is remarkable for the irregularity of its surface. The soil is fruitful. Its chief town and seaport, Stege, has a population of (1870) 1960.

**MÖRIS**, Lake, the ancient name of a sheet of water in Egypt, now known as *Birket-el-Kerûn*, or *El-Korn* ("The Lake of the Promontory"), is situated in the province of Fayûm, about 60 miles south-west of Cairo; extreme length from north-east to south-west, 30 miles; breadth, 6 miles; it was formerly much larger. Its average depth is 12, and its greatest ascertained depth 23 feet. On the north and west, its shores are rocky, but on the south, flat and sandy. It is connected with the Nile by a canal called *Bahr-Jusuf* ("The River of Joseph"). The waters are brackish, on account of their being impregnated with the alkaline salts of the desert, and with the muriate-of-lime depositions of the surrounding hills. In the time of the Pharaohs, the revenue derived from the fisheries was applied to the maintenance of the queen's wardrobe and perfumes. Under the Persians, they were let (during the season of the inundations, when the canal fed the lake) at £150 a day. At present, however, they only yield about £34 a year.

**MÖSIA**, an ancient Roman province, bounded by the Danube on the n., the

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**Mohammed**

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Black Sea on the e., the mountain-chains of *Hæmus* (Balkan) and *Orbelus* on the s., that of *Scardus* and the rivers *Drinus* (Driua) and *Savus* (Save) on the w. The river *Ciabus* (Cibriz) divided it into two parts, of which the Eastern (*Mæsia Inferior*) is the present Bulgaria, and the Western (*Mæsia Superior*) is Servia. Its original inhabitants were mostly of Thracian race. Gaulish or Celtic invaders settled in Western Mæsia about 277 B.C., under the name of *Scordisci*. The Romans first came in contact with the tribes of M. after the conquest of Macedonia, when C. Scribonius Curio forced his way as far north as the Danube, and gained a victory over the Mæsiæns (75 B.C.), but the country was not completely subjugated till 29 A.C. It was made a Roman province in the reign of Augustus, and flourished for more than two centuries, but as a frontier province it was much exposed to hostile invasions, and required a line of fortresses and stations all along the south bank of the Danube. In 250 A.D., the Goths made an irruption into the country, and defeated and slew the Roman emperor, Decius. In the following year, and about the end of the 4th c., it was given up to them by the Emperor Theodosius I. Slavonian tribes settled in M. in the 6th and 7th centuries.

**MÆSO-GOTHS**, the name given to the Goths who in the 8d c. settled in Lower Mæsia at the mouth of the Danube. Ulfilas (q. v.) was a Mæso-Goth. The name, however, became of more general use to designate those who remained in Mæsia after the great migration in the beginning of the 5th century.

**MOFFAT**, Robert, a distinguished missionary, was born at Ormiston, East Lothian, on the 21st of December 1795. Having resolved to become a missionary to the heathen, he offered his services to the London Missionary Society, was accepted, and sent by them to South Africa. Arriving at Cape Town in 1817, he immediately proceeded beyond the boundaries of Cape Colony to Namaqualand, where he entered upon his labors at the kraal of Africaner, a chief whose name had long been a terror to the people of the neighboring districts of the colony, on account of the audacious raids which he made among their settlements, and his ferocious character, but who had lately become a convert to Christianity, and now shewed a warm desire for its promotion. Here M. labored for three or four years with great success, Christianity and civilisation advancing together. But the situation, on account of the drought and sterility of the country, and its very thinly scattered population, being unsuitable for a principal mission-station, he set out in search of a better locality, and labored at several stations in succession in the countries to the north and north-east of Cape Colony. Wherever he went, the gospel was gladly received by some of those who heard it, and in some places by many. In every place he also guided the people in the arts of civilised life. He made several missionary tours, and his adventures were very remarkable, and are graphically described in his work, "Missionary Labors and Scenes in Southern Africa" (Lond. 1842), which he wrote and published during a visit of several years to Britain, rendered necessary by the state of his health. In 1842, M. returned to his labors in that country, and came back to England in 1870. His daughter was the wife of the celebrated Dr Livingstone. In 1873 he was presented with a sum of £5800 in recognition of his great services. He lectured on African missions in the nave of Westminster Abbey in 1876.

**MO'FFAT**, a market-town and favorite watering-place of Scotland, in the county of Dumfries, stands in the upper part of the broad and beautiful valley of the Annan, and is surrounded by hills of moderate elevation. It is two miles from the Beattock station, on the Caledonian Railway, and 19 miles north-north-east of Dumfries. Among other public edifices are the baths and the reading and assembly rooms. The mineral springs, the principal of which, like that of Harrogate, is saline and sulphurous, are highly celebrated; but perhaps the greatest attractions of the place are its salubrious air and exquisite environs. During the season, the town is increased in population by from 800 to 1000 visitors, to suit whose convenience great numbers of elegant villas, commanding fine views of the neighboring country, have been erected. Pop. (1871) 1730.—The Moffat Hills extend between the counties of Lanark and Peebles in the north, and Dumfries in the south; highest summit Hartfell, 2650 feet. See Black's "Guide to Moffat."

**MOGADO'RE**, or *Sne'rra*, a fortified town, and the principal seaport of Morocco, 130 miles west-south-west of the city of that name, on the Atlantic Ocean. Pop. about 20,000. It is the port of the capital, and was founded in 1760, on the site of

an old Portuguese fort. It stands on a rocky promontory, opposite an island of the same name, long a haunt of pirates, which forms the harbor, and is said to be the best built town of the kingdom. Its streets are regular, though narrow, and it consists of two parts, each surrounded by water. The quarter called the Fortress contains the custom-house, and the treasury, and is the residence of the pasha, the vice-consuls, and the Christian merchants. The town is defended by four batteries on the island, and by a fort on the land-side; the walls are also defensible. *M.* is the seat of considerable trade; it exports olive-oil, wool, gum, hides, feathers, gold-dust, and almonds. In 1873, 114 vessels, of 28,907 tons, entered, and 211 of 27,913 tons, cleared the port. The value of the cargo of those entering was £263,718; of those clearing, £259,930. The imports are woollens, cotton, hardware, &c.

**MOGUER** (Arab. "caves," of which there are many in the neighborhood), a town of Spain, in the province of Huelva, 43 miles west-south-west of Seville, rises gently above the Rio Tinto, near the mouth of which is its port, Palos. The streets are generally broad and straight, but both the town and castle are much dilapidated. The old Franciscan convent was ordered in 1846 to be preserved as a national memorial, but it is now fast going to ruin, and the wood of the cells stripped off. It was here, in 1484, that Columbus, craving charity, was received by the prior, Juan Perez de Marchena, by whose influence he was enabled to prosecute his discoveries, setting out from the port of Palos on August 3, 1492. It was to this port also that he returned, March 15, 1493, after having accomplished the great end of his expedition. Here likewise did Cortes land in May 1523, after the conquest of Mexico, and lodged in the same convent which gave shelter to Columbus. Palos is now a poor decayed fishing-port. *M.* has some trade in wine and fruit. Pop. 6600.

**MOGU'L**, Great, the popular designation of the emperor of Delhi, as the impersolation of the powerful empire established in Hindustan by the Mongols (q. v.), who were called *Moguls* by the Persians. The first Great Mogul was Baber, the great-grandson of Timur, who founded the Mongul empire in Hindustan in 1526. In 1603, the Great Mogul was deprived of his throne; in 1627, of even the appearance of authority, becoming a mere pensioner of the British; and in 1658, Mohammed Bahadur, the last of the dynasty, was condemned, and transported for complicity in the Indian mutiny.

**MOHACS**, a market-town of Hungary, 110 miles s.-s.-w of Pesth, on the western arm of the Danube. It contains a gymnasium, has an important cattle-market, is a station for steamboats on the Danube, and the seat of considerable trade in wine, coal, timber, and agricultural products. Pop. (1869) 12,140. It owes its historical importance to the great battle fought here, 29th August 1526, between Lewis II. of Hungary, with 25,000 Hungarians, and the Sultan Soliman, at the head of about 300,000 Turks. The battle resulted in the disastrous defeat of the Hungarians, who lost their king, 7 bishops, many nobles and dignitaries, and upwards of 22,000 men. A second battle was fought here on Aug. 12, 1687, when the Turks in their turn were defeated by an Austro-Hungarian army under Charles of Lorraine.

**MO'HAIR**, the wool of the Angora Goat (see GOAT and ANGORA), a native of Asia Minor. Few animals have so beautiful a covering as the fine, soft, silky, long, and always pure white wool of this goat. Each animal, at the annual clip in April or May, yields from 2 lbs. to 4 lbs. of wool. It is only within the last 30 years that *M.* has been in great request in Britain, but its development as an article of trade has been simultaneous with that of alpaca. In 1876 the amount of mohair and other goats' hair imported was 5,848,199 lbs.; the value £711,717. See WOOLLEN MANUFACTURES.

**MOHAMMED** (Arab. *the Praised*), the name taken, at a later period, by the founder of Islam. He was originally called *Halabi*. He was born about the year 570 A. D., at Mecca, and was the son of Abdallah, of the family of the Hashim; and of Amina, of the family of Zuhra, both of the powerful tribe of the Koreishi, but of a side-branch only, and therefore of little or no influence. His father, a poor merchant, died either

\* Or, according to Deutsch, whose view is fully corroborated and adopted by Sprenger in his "Leben und Lehre Mohammads," in allusion to Hag. ii. 7, the predicted Messiah.

before or shortly after M.'s birth, whom his mother then (according to a doubtful tradition) is supposed to have handed over, after the fashion of her tribe, to a Beduin woman, that she might nurse him in the salubrious air of the desert. In consequence of the repeated fits of the child, however, which were ascribed to demons, the nurse sent him back in his third year. When six years old, he also lost his mother. His grandfather, Abd-Al-Mutallib, adopted the boy; and when, two years later, he too died, M.'s uncle, Abu Talib, though poor himself, took him into his house, and remained his best friend and protector throughout his whole life. The accounts which have survived of the time of his youth are of too legendary a nature to deserve credit; certain, however, it seems to be that he at first gained a scanty livelihood by tending the flocks of the Meccans, and that he once or twice accompanied his uncle on his journeys to Southern Arabia and Syria. In his 25th year, he entered the service of a rich widow, named Chadidja, likewise descended from the Koreish, and accompanied her caravans—in an inferior capacity, perhaps as a camel-driver—to the fairs. Up to that time, his circumstances were very poor. Suddenly his fortune changed. The wealthy, but much older, and twice widowed Chadidja offered him her hand, which he accepted. She bore him a son, Al-Kâsim—whence M. adopted the name Abu Al-Kâsim—and four daughters: Zainab, Rukajja, Umm Kulthûm, and Fâtima; and afterwards a second son, whom he called Abd Mauf, after an idol worshipped among his tribe. Both his sons, however, died early. M. continued his merchant's trade at Mecca, but without much energy, spending most of his time in solitary contemplations. In his 35th year, he is said to have, by chance only, been chosen arbiter in a quarrel about the replacig of the sacred black stone in the Kaaba (q. v.); but not before his 40th year is there anything really important to be told of his life.

Before, however, entering on the weighty events of the subsequent period, it is by no means unimportant to advert to such traits of M.'s outward appearance as are yet recoverable. He was of middle height, rather lean, but broad shouldered, and altogether of strong build; slightly curled black hair flowed round his strongly developed head; his eyes, overhung with thick eyelashes, were large and coal-black; his nose, large and slightly bent, was well formed. A long beard added to the dignity of his appearance. A black mole between his shoulders became afterwards among the faithful "the seal of prophecy." In his walk, he moved his whole body violently, "as if descending a mountain." His gait and presence were altogether of an extremely imposing nature. In his 40th year M. received his first "revelation," or, in other words, became first aware that he had a "mission." About the year 600 A.D., Christianity had penetrated into the heart of Arabia, through Syria on the one, and Abyssinia on the other hand. Judaism no less played a prominent part in the peninsula, chiefly in its northern parts, which were dotted over with Jewish colonies, founded by emigrants after the destruction of Jerusalem; and round about Yathrib (Medina). Besides these two all-important religious elements, several sects, remnants of the numerous ancient sects which had sprung up everywhere during the first Christian centuries: Sabians, Mandæans, &c., on the frontiers of Syria and Babylonia, heightened the religious ferment which, shortly before the time of M., had begun to move the minds of the thoughtful. At that time there arose, according to undoubted historical accounts, several men in the Hedjaz (Waraka, Obaid Allah, Othman, Zayd, &c.), who preached the futility of the ancient pagan creed, with its star-worship, its pilgrimages, and festive ceremonies, its temples and fetiches. It had in reality long ceased to be a living faith, and only the great mass of the people clung to it as to a sacred inheritance from times immemorial. The unity of God, the "ancient religion of Abraham," was the doctrine promulgated by these forerunners of M., and many of those who, roused by their words, began to search for a form of religion which should embody both the traditions of their forefathers and a purer doctrine of the Divinity, turned either to Judaism or to Christianity. The principal scene of these missionary labors was Mecca, then the centre of the pilgrimages of most of the Arabian tribes, and where, from times immemorial, long anterior to the city itself, the Kaaba (q. v.), Mount Arafat, the Valley of Mina, &c., were held sacred—the Koreish, M.'s tribe, having the supreme care over these sanctuaries, ever since the 5th century. It was under these circumstances that M. felt "moved" to teach a new faith, which should dispense with idolatry on the one, as with Judaism and Christianity on the other hand. He was 40 years of

age, as we said, when he received the first "divine" communication in the solitude of the mountain Hira, near Mecca. Gabriel appeared to him, and in the name of God commanded him to "read"—that is, to preach the true religion, and to spread it abroad by committing it to writing (Sur. xcvi.). How far M. was a "prophet," in the common sense of the word, has been the subject of endless and utterly futile discussions in the Christian world. That he was no vulgar impostor, is now as generally recognised as that other once popular doctrine, that he was in league with the devil, is rejected by thinking men. What part his epilepsy had in his "visions" we are not able to determine. Certain it is that, after long and painful solitary broodings, a something—not clearly known to himself—at times moved him with such fearfully rapturous vehemence, that, during his revelations, he is said to have roared like a camel, and to have streamed with perspiration; his eyes turned red, and the foam stood before his mouth. The voices he heard were sometimes those of a bell, sometimes of a man, sometimes they came in his dreams, or they were laid in his heart. Waraka, one of his wife's relatives, who had embraced Judaism, spoke to him of the Jewish doctrine, and told him the story of the patriarchs and Israel; not so much as it is told in the Bible, but in the Midrash; and the gorgeous hues of the legendary poetry of the latter seem to have made an deep impression on M.'s poetical mind as the doctrine of the unity of God and the *morale*—in its broad outline—of the Old Testament, together with those civil and religious laws, scriptural and oral, which are either contained as germs or fully developed in this record. Christianity exercised a minor influence upon him and his spiritual offspring. All his knowledge of the New Testament was confined to a few apocryphal books, and with all the deep reverence before Jesus, whom, together with Moses, he calls the greatest prophet, next to himself, his notions of the Christian religion and its founder were excessively vague. For some details on these points, however, we must refer to KORAN and MOHAMMEDANISM.

His first revelation he communicated to no one, it would appear, except to Chaddja, to his daughters, his stepson Ali, his favorite slave Zaid—whom he had probably freed and adopted by this time—and to his friend the prudent and honest Abu Bekr. His other relatives rejected his teachings with scorn. Abu Lahab, his uncle, called him a fool; and Abu Talib, his adoptive father, although he never ceased, for the honor of his family, to protect him, yet never professed any belief in M.'s words. In the fourth year of his mission, however, he had made forty proselytes, chiefly slaves and people from the lower ranks; and now first some verses were revealed to him, commanding him to come forward publicly as a preacher, and to defy the scorn of the unbelievers. With all his power, he now inveighed against the primeval superstition of the Meccans, and exhorted them to a pious and moral life, and to the belief in an all-mighty, all-wise, everlasting, indivisible, all-just, but merciful God, who had chosen him as he had chosen the prophets of the Bible before him, so to teach mankind that they should escape the punishments of hell, and inherit everlasting life. God's mercy—this was a primitive doctrine, common to the whole East—was principally to be obtained by prayer, fasting, and almsgiving. The belief in the sacredness of the Kaaba and the ceremonies of the pilgrimage was too firmly rooted in his and the people's minds not to be received into the new creed; but certain barbarous habits of the Bedouins, such as the killing of their new-born daughters, were ruthlessly condemned by Mohammed. The prohibition of certain kinds of food also belongs to this first period, when he as yet entirely stood under the influence of Judaism; the prohibition of gambling, usury, &c., probably being of a somewhat later date. Whether he did or did not understand the art of writing and reading at the commencement of his career, is not quite clear; certain it is that he pretended not to know it, and employed the services of an amanuensis for his Koranic dicta, which at first consisted merely of brief, rhymed sentences in the manner of the ancient Arabic soothsayers. [KORAN.] The Meccans did not object to his deluging; they considered him a common "poet" or "soothsayer," who, moreover, was not in his right senses, or simply a liar. Gradually, however, as the number of his converts increased, they began to pay more and more attention to his proceedings; and finally, fearing mostly for the sacredness of Mecca, which the new doctrine might abolish, thus depriving them of their chief glory and the ample revenues of the pilgrimages, they rose in fierce opposition against the new prophet and his adherents, who dared "to call their ancient gods idols, and their ancestors fools." Many of the converted



slaves and freedmen had to undergo terrible punishments; and others suffered so much at the hands of their own relatives, that they were fain to revoke their creed; so that the prophet himself advised his followers to emigrate to Abyssinia. M. himself, although protected by the strong arm of Abu Talib, was yet at that time so low-spirited and fearful, that he even raised the idols, which hitherto he had represented as nought, to intermediate beings between God and man—a dictum, however, which he soon revoked, as an inspiration of Satan, thereby increasing the hatred of his adversaries, at whose head stood two members of the family of Machzûm, Al-Walid and Abulhakam Amr (called by Mohammed "Father of Foolishness"), and who in every way tried to throw ridicule on him. At last it became necessary that he should be put beyond the reach of his persecutors, and Abu Talib hid him in a fortified castle of his own in the country. Hamza, his uncle, and Omar, formerly a bitter enemy of M., and who afterwards, with M. and Abu Bekr, became the third head of Islam, continued in the meantime to spread the new doctrine. The Koreish now demanded that M. should be delivered into their hands; but Abu Talib steadfastly refused to comply with their wishes; a feud thereupon broke out between their family and that of the Hashemites, and M. and all the members of his family, except, perhaps, Abu Lahab, were excommunicated. After the space of three years, however, the "peace party" in Mecca brought about a reconciliation, and M. was allowed to return. A great grief befell him at this time—his faithful wife Chaddja died, and, shortly afterwards, his uncle Abu Talib, and, to add to his misery, the vicissitudes of his career had reduced him by this time to poverty. An emigration to Taif, where he sought to improve his position, proved a failure; it was with great difficulty that he escaped with his bare life. During this epoch, he had the well-known dream of his journey to Jerusalem and in the heavens on the back of the Borak (Miraj), the relation of which caused even his staunchest adherents to smile at his hallucination. Shortly after his return from Taif, he married Sauda, and afterwards so increased the number of his wives, that at his death he still left nine, of whom Ayishah, the daughter of Abu Bekr, and Hafsa, the daughter of Omar, are best known. In the midst of his vain endeavors to find a hearing in his own city, and those near it, he succeeded, during a pilgrimage, in converting several men from Medina, whose inhabitants had long been accustomed to hear from the mouths of the numerous Jews living in the city and its neighborhood the words Revelation, Prophecy, God's Word, Messiah: to the Meccans mere sounds without any meaning. The seed sown into the minds of these men bore a fruitful harvest. The next pilgrimage brought twelve, and the third more than seventy adherents to the new faith from Medina, and with these he entered into a close alliance. M. now conceived the plan to seek refuge in the friendly city of Medina, and about 622 (ten, thirteen, or fifteen years—according to the different traditions—after his first assuming the sacred office) he fled thither, about one hundred families of his faithful flock having preceded him some time before, accompanied by Abu Bekr, and reached, not without danger, the town, called thence *Medinat Annabi* (City of the Prophet), or Medina "City," by way of eminence; and from this flight or rather from the first month of the next Arabic year, dates the Mohammedan Era (Hedjah). Now everything was changed to the advantage of the prophet and his religion; and if formerly the incidents of his life are shrouded in comparative obscurity, they are, from this date, known often to their most insignificant details. Formerly a despised "madman or impostor," he now assumed at once the position of highest judge, lawgiver, and ruler of the city and two most powerful Arabic tribes. His first care was directed towards the consolidation of the new worship, and the inner arrangements in the congregation of his flock; his next chief endeavor was to proselytise the numerous Jews who inhabited the city, to whom, besides having received their principal dogmas into his religion, he made many important concessions also in the outer observances of Islam, and concluded alliances with many of their tribes; but he was sorely disappointed in his hopes to convert them. They ridiculed his pretension to be the Messiah, and so enraged him by their constant taunts, that he soon abrogated his concessions, and became their bitterest adversary up to the hour of his death. The most important act in the first year of the Hedjah was his permission to go to war with the enemies of Islam in the name of God—a kind of manifesto chiefly directed against the Meccans. Not being able at first to fight his enemies in open field, he endeavored to weaken their power by

attacking the caravans of the Koreish on their way to Syria. Being successful enough to disturb their trade, and, at the same time, to conclude alliances with the adjoining Beduin tribes, he at last dared to break even the peace of the sacred month of Radjab, and with this the signal to open warfare was given. A battle, the first, between 314 Moellins and about 600 Meccans was fought at Badr, in the second year of the Hedjrah; the former gained the victory, and made many prisoners. A great number of adventurers now flocked to M.'s colors, and he successfully continued his expeditions against the Koreish and the Jewish tribes, chiefly the Beni Keinukâ, whose fortified castles he took after a long siege. Notwithstanding a severe loss which he suffered in the battle near Ohod, in which he himself was dangerously wounded, his power increased so rapidly that in the sixth year of the Hedjrah already he was able to proclaim a public pilgrimage to Mecca. Although the Meccans did not allow this to be carried out, he gained the still greater advantage, that they concluded a formal peace with him, and thus recognised him as an equal power and belligerent. He was now allowed to send his missionaries all over Arabia, and even beyond the frontiers, without any hindrance; and in the following year he had the satisfaction of celebrating the pilgrimage for three days undisturbed at Mecca. Shortly afterwards, during his expeditions against the Jews of Chaibar and Fadak, M. very nearly lost his life: a Jewess, Zainab by name, a relative of whom had fallen in the fight against him, placed a poisoned piece of roast meat before him, and although he merely tasted it, he yet, up to his death, suffered from the effects of the poison. His missionaries at this time began to carry his doctrines abroad, to Chosroes II., to Heraclius, to the king of Abyssinia, the Viceroy of Egypt, and the chiefs of several Arabic provinces. Some received the new gospel; but Chosroë Parvis, the king of Persia, and Amru the Ghassawide, rejected his proposals with scorn, and the latter had the messenger executed. This was the cause of the first war between the Christians and the Muslime, in which the latter were beaten with great loss by Amru. The Meccans now thought the long-desired moment of revenge at hand, and broke the peace by committing several acts of violence against the Chuzaites, the allies of Mohammed. The latter, however, marched at the head of 10,000 men against Mecca, before its inhabitants had had time to prepare for the siege, took it, and was publicly recognised by them as chief and prophet. With this the victory of the new religion was secured in Arabia. While, however, employed in destroying all traces of idolatry in the besieged city, and fixing the minor laws and ceremonies of the true faith, M. heard of new armies which several warlike Arabic tribes marched against him, and which were concentrated near Talf (630). Again he was victorious, and his dominion and creed extended further and further every day. From all parts flocked the deputations to do homage to him in the name of the various tribes, either as the messenger of God, or at least as the Prince of Arabia, and the year 8 of the Hedjrah was therefore called the year of the Deputations. Once more he made most extensive preparations for a war against the Byzantines; but not being able to bring together a sufficient army, he had to be satisfied with the homage of a few minor princes on his way to the frontiers, and to return without having carried out his intention. Towards the end of the 10th year of the Hedjrah he undertook, at the head of at least 40,000 Muslims, his last solemn pilgrimage to Mecca, and there (on the Mount Arafat) instructed them in all the important laws and ordinances, chiefly of the pilgrimage; and the ceremonies observed by him on that occasion were fixed for all times. [HAJJ.] He again solemnly exhorted his believers to righteousness and piety, and chiefly recommended them to protect the weak, the poor, and the women, and to abstain from usury.

Returned from Mecca, he occupied himself again with the carrying out of his expedition against Syria, but fell dangerously ill very soon after his return. One night, while suffering from an attack of fever, he went to the cemetery of Medina, and prayed and wept upon the tombs, praising the dead, and wishing that he himself might soon be delivered from the storms of this world. For a few more days he went about; at last, too weak further to visit his wives, he chose the house of Ayesha, situated near a mosque, as his abode during his sickness. He continued to take part in the public prayers as long as he could; until at last, feeling that his hour had come, he once more preached to the people, recommending Abu Bekr and Uma, the son of Zaid, as the generals whom he had chosen for the army. He then asked,

like Moses, whether he had wronged any one, and read to them passages from the Koran, preparing the minds of his hearers for his death, and exhorting them to peace among themselves, and to strict obedience to the tenets of the faith. A few days afterwards, he asked for writing materials, probably in order to fix a successor to his office as chief of the faithful; but Omar, fearing he might choose Ali, while he himself inclined to Abu Bekr, would not allow him to be furnished with them. In his last wanderings he only spoke of angels and heaven. He died in the lap of Ayesha, about noon of Monday the 12th (11th) of the third month, in the year 11 of the Hedjrah (5th of June 634). His death caused an immense excitement and distress among the faithful, and Omar, who himself would not believe in it, tried to persuade the people of his still being alive. But Abu Bekr said to the assembled multitude: "Whoever among you has served Mohammed, let him know that Mohammed is dead; but he who has served the God of Mohammed, let him continue in his service, for he is still alive, and never dies." While his corpse was yet unburied, the quarrels about his successor, whom he had not definitely been able to appoint, commenced; and finally, Abu Bekr received the homage of the principal Muehlms at Medina. M. was then buried in the night from the 9th to the 10th of June, after long discussions, in the house of Ayesha, where he had died, and which afterwards became part of the adjoining mosque.

This, in briefest outline, is M.'s career. We have not been able to dwell, as we could have wished to do, with any length, either on the peculiar circumstances of his inner life, which preceded and accompanied his "prophetic" course, nor on the part which Idolatry, Judaism, Christianity, and his own reflection respectively, bore in the formation of his religion; nor have we been able to trace the process by which his "mission" grew upon him, as it were, and he, from a simple admonisher of his family, became the founder of a faith to which now above 130 millions are said to adhere. The articles **KORAN** and **MOHAMMEDANISM** contain some further details on his doctrine and its history. We have, in addition to the few observations on the points indicated at the beginning, only to reiterate, that a man of Mohammed's extraordinary powers and gifts is not to be judged by a modern common-place standard; and that the manners and morals of his own time and country must also be taken into consideration. We are far from overrating his character. He was at times deceitful, cunning, even revengeful and cowardly; and generally addicted beyond limit to sensuality. But all this does not justify the savage and silly abuse which has been heaped upon his name for centuries by ignorance and fanaticism. Not only his public station as prophet, preacher, and prince, but also his private character, his amiability, his faithfulness towards friends, his tenderness towards his family, and the frequent readiness to forgive an enemy; besides the extreme simplicity of his domestic life (he lived, when already in full power, in a miserable hut, mended his own clothes, and freed all his slaves), must be taken into consideration; and, to do him full justice, his melancholic temperament, his nervousness, often bordering on frenzy, and which brought him to the brink of suicide, and his being a poet of the highest order, with all the weaknesses of a poet developed to excess, must not be forgotten. Altogether, his mind contained the strangest mixture of right and wrong, of truth and error. Although his self-chosen mission was the abolition of superstition, he yet believed in Jins, omens, charms, and dreams, and this is an additional reason against the, as we said, now generally abandoned notion, that he was a vulgar designer, who by no means deceived himself about those revelations which he pretended to have received. And however much the religion of Islam may, rightly or wrongly, be considered the cause and prime cause of the rottenness of eastern states and nations in our day, it must, in the first place, not be forgotten that it is not necessarily Islam which has caused the corruption, as indeed its ethics are for the most part of the highest order; and in the second place, that Mohammed is not to be made responsible for all the errors of his successors. Take him all in all, the history of humanity has seen few more earnest, noble, and sincere "prophets"—using the word prophet in the broad human sense of one irresistibly impelled by an inner power to admonish, and to teach, and to utter austere and sublime truths, the full purport of which is often unknown to himself.

The most important European biographies of M. are those of Sprenger, Well, Muir, Nöldeke, Renaud. See also **KORAN**, **MOHAMMEDANISM**, **SUNNA**.

**MOHAMMED**, the name of four sultans of Turkey, of whom the most noted is **MOHAMMED II.**, surnamed *Bujuk* or the **THE GREAT**, the conqueror of Constantinople. He was born at Adrianople in 1430, and succeeded his father, Amurath II., in 1460. His first acts were the murder of his two brothers, and the suppression of a rebellion in Karaman. Having thus secured himself on the throne, he bent all his energies to the accomplishment of the great project which had always been kept prominently in view by his predecessors—the capture of Constantinople. This city was now the sole remnant of the once mighty empire of the Cæsars; and after more than a year spent in preparations, M. commenced the siege, 6th April 1453, with an army of 258,000 men, and a fleet of 320 vessels. The Greeks, aided by a gallant band of 2000 strangers, under Gian Justiniani, a noble Genoese, long maintained an obstinate resistance. On the morning of the 29th May, a combined attack was made by land and sea without success; but the retirement from the ramparts of Justiniani, who had been severely wounded; and despaired of a successful defence, caused a panic among his followers, and the simultaneous charge of a cho-en body of janizaries, with M. himself at their head, was irresistible. Constantine XIII. died in the breach, and the Turks poured in over his corpse to plunder and devastate his capital. M. now transferred the seat of his government to Constantinople, and sought to win back the inhabitants by promising them the free exercise of their religion. He next reduced the kingdoms of Morea and Trebizond, offshoots of the Greek empire, obtained possession of Servia on the death of its last prince, and made formidable preparations for the invasion of Hungary. Belgrade was the first point of attack; and with 100,000 men, supported by a fleet of 200 ships on the Danube, M. sat down before its walls. The enormous ordnance which had done such good service at Constantinople, were employed to batter the ramparts; but the valor, skill, and activity of the defenders foiled his utmost efforts. John Hunyady (q. v.), who, with 6000 chosen troops, had reinforced the garrison, destroyed or captured all his vessels, and soon after, by a sudden sally, defeated his army, and carried off the battering-train, compelling him to raise the siege, 6th August, 1456. His next enterprise was the invasion of Epirus, where Scanderbeg had hitherto successfully defied the sultan's power. Three Turkish armies were destroyed in rapid succession, and a fourth and fifth under M. himself met with no greater success; but the death of the gallant Epirote, in 1467, removed the only obstacle to the success of the sultan's plans, and Epirus was forthwith annexed to Turkey. The latter half of M's reign was also fruitful in important achievements, but our space will permit only a cursory notice of them. He reduced the Khan of the Crimea to the condition of a vassal, deprived the Genoese of Caffa, and the Venetians of Friuli, Istrin, Negropont, and Lemnoe; but the Knights of St John repelled him from Rhodes, and the Venetians from Scodra. He carried his arms into Italy, and took Otranto, but died in 1481 at Nicomedian, while on the way to join his son Bajazet, who was warring with the Persians and Egyptians. His frequent contests with the former of these nations had always interfered very much with the successful prosecution of his designs of conquest in Europe. M. was possessed of great abilities; he was brave, enterprising, and sagacious; nor was he deficient in learning, for he spoke four languages fluently, was well versed in geography, ancient history, and the natural sciences, and was practically acquainted with the fine arts. But the brilliancy of his career, and the occasional generosity and even magnanimity which he shewed, cannot obliterate the recollection of those acts of cruelty and treachery which have justly branded him as the most ruthless tyrant of the House of Osman. As the founder of the Turkish power in Europe, his memory has always been revered by the Turks.

**MOHAMMEDANISM**, the religion founded by Mohammed, or, according to him, the only orthodox creed existing from the beginning of the world, and preached by all the prophets ever since Adam. It is also called *Islâm*, Resignation, entire Submission to the will and precepts of God. In its exclusively dogmatical or theoretical part, it is *Imân*, Faith; in its practical, *Dîn*, Religion (by way of eminence). The fundamental principles of the former are contained in the two articles of belief: "There is no God but God; and Mohammed is God's Apostle." The Mohammedan doctrine of God's nature and attributes coincides with the Christian, in so far as he is by both taught to be the Creator of all things in heaven and earth, who rules and preserves all things, without beginning, omnipotent, omniscient, omnipresent, and full of mercy. Yet, according to

the Mohammedan belief, he has no offspring: "He begetteth not, nor is he begotten." Nor is Jesus called anything but a prophet and apostle, although his birth is said to have been due to a miraculous divine operation; and as the Koran superseded the Gospel, so Mohammed, Christ. The crucifixion is said to have been executed upon another person, Christ having been taken up unto God before the decree was carried out. He will come again upon the earth, to establish everywhere the Moslem religion, and to be a sign of the coming of the day of judgment. Next to the belief in God, that in angels forms a prominent dogma. Created of fire, and endowed with a kind of incorporeal body, they stand between God and man, adoring or waiting upon the former, or interceding for and guarding the latter. The four chief angels are the "Holy Spirit," or "Angel of Revelations"—Gabriel; the special protector and guardian of the Jews—Michael; the "Angel of Death"—Azrael (Raphael, in the apocryphal gospel of Barnabas), and Israfil—Uriel, whose office it will be to sound the trumpet at the Resurrection. It will hardly be necessary, after what we said under MOHAMMED, to point out, in every individual instance, how most of his "religious" notions were taken almost bodily from the Jewish legends; his angelology, however, the Jews had borrowed themselves from the Persians, only altering the names, and, in a few cases, the offices of the chief angelic dignitaries. Besides angels, there are good and evil genii, the chief of the latter being Iblis (Despair), once called Azazel, who, refusing to pay homage to Adam, was rejected by God. These Jin are of a grosser fabric than angels, and subject to death. They, too, have different names and offices (Peri, Fairies; Div, Giants; Takvins, Fates, &c.), and are, in almost every respect, like the Shédim in the Talmud and Midrash. A further point of belief is that in certain God-given Scriptures, revealed successively to the different prophets. Four only of the original one hundred and four sacred books: viz., the Pentateuch, the Paulins, the Gospel, and the Koran, are said to have survived; the three former, however, in a mutilated and falsified condition. Besides these, a certain apocryphal gospel attributed to St Barnabas, and the writings of Daniel, together with those of a few other prophets, are taken notice of by the Moslems, but not as canonical books. The number of prophets sent at various times, is stated variously at between two and three hundred thousand, among whom 313 were apostles, and six were specially commissioned to proclaim new laws and dispensations, which abrogated the preceding ones. These were Adam, Noah, Abraham, Moses, Jesus, and Mohammed—the last greatest of them all, and the propagator of the final dispensation. The belief in the resurrection and the final judgment is the next article of faith. The dead are received in their graves by an angel announcing the coming of the two examiners, Monker, and Nakir, who put questions to the corpse respecting his belief in God and Mohammed, and who, in accordance with the answers, either torture or comfort him. This, again, is the Jewish "Chibbut hakkeber," the Beating of the Grave, a hyperbolical description of the sufferings during the intermediate state after death (purgatory). The soul, awaiting the general resurrection, enters according to its rank, either immediately into paradise (prophets), or partakes, in the shape of a green bird, of the delights of the abode of bliss (martyrs), or—in the case of common believers—is supposed either to stay near the grave, or to be with Adam in the lowest heaven, or to remain either in the well of Zem-Zem, or in the trumpet of the resurrection. According to others, it rests in the shape of a white bird under the throne of God. The souls of the infidels dwell in a certain well in the province of Hadramant (Heb. Chambers of Death), or, being first offered to heaven, then offered to earth, and rejected by either, subject to unspeakable tortures until the day of resurrection. Concerning the latter, great discrepancy reigns among the Mohammedan theologians. Mohammed himself seems to have held that both body and soul will be raised, and the "Bone Luz" of the Jewish Haggadah was by him transformed into the bone Al Ajb, the rump-bone, which will remain uncorrupted till the last day, and from which the whole body will spring anew, after a forty days' rain. Among the signs by which the approach of the last day may be known—nearly all taken from the legendary part of the Talmud and Midrash, where the signs of the coming of the Messiah are enumerated—are the decay of faith among men, the advancing of the meanest persons to highest dignities, wars, seditions, and tumults, and consequent dire distress, so that a man passing another's grave shall say: "Would to God I were in his place!" Certain provinces shall revolt, and the

buildings of Medina shall reach to Ynhâb. Again: the sun will rise in the west, the Beast will appear, Constantinople will be taken by the descendants of Isaac, the Anti-Christ will come, and be killed by Jesus at Lud. There will further take place a war with the Jews, Gog and Magog's (Jajug and Majuj's) eruption, a great smoke, an eclipse, the Mohammedans will return to idolatry, a great treasure will be found in the Euphrates, the Kaaba will be destroyed by the Ethiopians, beasts and inanimate things will speak, and finally, a wind will sweep away the souls of those who have faith, even if equal only to a grain of mustard seed, so that the world shall be left in ignorance. The time of the resurrection, even Mohammed could not learn from Gabriel; it is a mystery. Three blasts will announce it: that of consternation, of such terrible powers, that mothers shall neglect the babes on their breasts, and that heaven and earth will melt; that of examination, which will annihilate all things and beings, even the angel of death, save paradise and hell, and their inhabitants; and forty years later, that of resurrection, when all men, Mohammed first, shall have their souls breathed into their restored bodies, and will sleep in their sepulchres until the final doom has been passed upon them. The day of judgment, lasting from one to fifty thousand years, will call up angels, genii, men, and animals. The trial over, the righteous will enter paradise, to the right hand, and the wicked will pass to the left, into hell; both, however, have first to go over the bridge Al Sirât, laid over the midst of hell, and finer than a hair, and sharper than the edge of a sword, and beset with thorns on either side. The righteous will proceed on their path with ease and swiftness, but the wicked will fall down headlong to hell below—a place divided into seven stories or apartments, respectively assigned to Mohammedans, Jews, Christians, Sabians, Magians, idolaters, and—the lowest of all—to the hypocrites, who, outwardly professing a religion, in reality had none. The degrees of pain—chiefly consisting in intense heat and cold—vary; but the Mohammedans, and all those who professed the unity of God, will finally be released, while unbelievers and idolaters will be condemned to eternal punishment. Paradise is divided from hell by a partition (Orf), in which a certain number of half-saints will find place. The blessed, destined for the abodes of eternal delight (Jannat Aden, Heb. Gan Eden)—of which it is, however, not quite certain whether it is created already—will first drink of the Pond of the Prophet, which is supplied from the rivers of paradise, whiter than milk, and more odoriferous than musk. Arrived at one of the eight gates, they will be met by beautiful youths and angels; and their degree of righteousness (prophecy, religious teachers, martyrs, believers) will procure for them the corresponding degree of happiness. It may, however, not be superfluous to add, that, according to the Mohammedan doctrine, it is not a person's good works or merits which gain him admittance, but solely God's mercy; also that the poor will enter paradise five hundred years before the rich; and that the majority of the inhabitants of hell are women. As to the various felicities which await the pious (and of which there are about a hundred degrees), they are a wild conglomeration of Jewish, Christian, Magian, and other fancies on the subject, to which the Prophet's own exceedingly sensual imagination has added very considerably. Feasting in the most gorgeous and delicious variety, the most costly and brilliant garments, odors and music of the most ravishing nature, and above all, the enjoyment of the Hûr Al Oÿn, the black-eyed daughters of paradise, created of pure musk, and free from all the bodily weaknesses of the female sex, are held out as a reward to the commonest inhabitants of paradise, who will always remain in the full vigor of their youth and manhood.\* For those deserving a higher degree of recompense, rewards will be prepared of a purely spiritual kind—i.e., the "beholding of God's face" (Shechluah) by night and by day. A separate abode of happiness will also be reserved for women, but there is considerable doubt as to the manner of their enjoyment. That they are not of a prominently spiritual

\* "The whole earth will be as one loaf of bread, which God will reach to them like a cake; for meat they will have the ox Bâlm and the fish Nûn, the lobes of whose livers will suffice seventy thousand men. Every believer will have eighty thousand servants and seventy-two girls of paradise, besides his own former wives, if he should wish for these, and a large tent of pearls, jacinths, and emeralds: three hundred dishes of gold shall be set before each guest at once, and the last morsel will be as grateful as the first. Wine will be permitted, and will flow copiously,

nature, is clear from the story of the Prophet and the old woman. The latter solicited Mohammed to intercede with God that she might be admitted into paradise, whereupon he replied that old women were not allowed in paradise, which dictum—causing her to weep—he further explained by saying that they would first be made young again. The last of the precepts of pure faith taught by Mohammedanism is the full and unconditional submission to God's decree (ISLAM), and the predestination of good and evil, which is found from the beginning inscribed on a "preserved tablet." Not only a man's fortunes, but his deeds, and consequently his future reward or punishment, are irrevocably, and thus unavoidably, pre-ordained (Fate): a doctrine which is not, however, taken literally by *all* Moslems, but which has no doubt contributed largely to the success of Islam, by inspiring its champions with the greatest indifference and contempt for the dangers of warfare; their destiny being immutably fixed under any circumstances.

Thus far, briefly, the Iman, dogmatical or theoretical part of Islam. The Din, or practical part, which contains the ritual and moral laws, incites as the chief duties the following four: prayer, alms-giving, fasting, and pilgrimage.

Prayer, "the key of paradise," comprises also certain religious purifications, as the most necessary preparations to the former. They are of two kinds: the *Ghusl*, or total immersion of the body, required as a religious ceremony, on some special occasions; and the *Wudu*, a partial ablution, to be performed immediately before the prayer. This is of primary importance, and consists of the washing of hands, face, ears, and feet up to the ankles—a proceeding generally accompanied at each stage by corresponding pious sentences, and concluded by the recital of the 97th chapter of the Koran. In the case of water being beyond reach, dry dust or sand may supply its place. "The practice of religion being founded on cleanliness," it is not sufficient that the believer himself should be purified, but even the ground or the carpet upon which he prays must be as clean as possible, and the use of a special prayer-carpet (*Seggadah*) is therefore recommended. Every Mohammedan is obliged to pray five times in the space of every twenty-four hours. The prayer (*Salah*) itself consists partly of extracts from the Revealed Book, the Koran (*Fard*), partly of pieces ordained by the Prophet without allegation of a divine order (*Sunnah*). The first time of prayer commences at the Maghrib, or about sunset; the second at the Eshâ, or nightfall; the third, at the Subh, or daybreak; the fourth, at the Duhr, or about noon; the fifth, at the Aar, or afternoon. The believers are not to commence their prayers exactly at sunrise, or noon, or sunset, lest they might be confounded with the infidel Sunn-worshippers. These several times of prayer are announced by the Muëddis (q. v.) from the minarets or madnehs of the mosques. Their chant, sung to a very simple but solemn melody, sounds harmoniously and sonorously down the height of the mosque, through the mid-day din and roar of the cities, but its impression is one of the most strikingly poetical in the stillness of night; so much so, that even many Europeans cannot help congratulating the Prophet on his preferring the human voice to either the Jewish trumpet-call of the time of the Temple, or the Christian church-bells. The day-call (the *Adan*) consists chiefly of the confession of faith (God is most great—Mohammed is God's apostle—come to prayer, come to security) repeated several times; the night-calls (*Uia*, the first; *Ebed*, the second), destined for persons who desire to perform supererogatory acts of devotion, are much longer. The believer often changes his posture during his prayers, and a certain number of such inclinations of head and knees, prostrations, &c., is called a *Rekah*. It is also necessary that the face of the worshipper should be turned towards the Kibleh, in the direction of Mecca (q. v.), the exterior wall of the mosque marking that direction being distinguished by a niche (*Mehrab*). All sumptuous and pompous apparel is laid aside before the believer approaches the sacred place; and the extreme solemn-

without inebriating. The righteous will be clothed in the most precious silks and gold, and will be crowned with crowns of the most resplendent pearls and jewels. If they desire children, they shall beget them, and see them grow up within an hour. Besides the ravishing songs of the angel Israfil and the daughters of paradise, the very trees will, by the rustling of their boughs, the clanging of bells suspended from them, and the clashing of their fruits, which are pearls and emeralds, make sweetest music."

nity and decorum, the unaffected humility, the real and all-absorbing devotion which pervades it, have been unanimously held up as an example to other creeds. Women, although not strictly forbidden to enter the mosque, yet are not practically allowed to pray there, lest their presence might be hurtful to true devotion. Besides these prayers, there are others ordained for special occasions, as on a pilgrimage, before a battle, at funerals, during an eclipse, &c. That the Moslems do not pray to Mohammed, but simply implore his intercession, as they do that of the numerous saints, the relatives of the Prophet, and the first propagators of Islam, need, after what we said under MOHAMMED, not be dwelt upon here. For the particulars of the service in the Mosque, the reader is referred to that heading. It may be remarked in passing, that Mohammedanism has no clergy in our sense of the word, the civil and religious law being bound up in one. See also MOLLAH, MUFTI.

Next in importance stands the duty of giving alms. There are twofold—legal (*Zekah*) and voluntary (*Sadakah*; Heb. *Zedakah*, plety, righteousness); but the former, once collected by the sovereign, and applied to pious uses, has now been practically abrogated. The *Sadakah* is, according to the law, to be given once every year, of cattle, money, corn, fruits, and wares sold, at about the rate of from two and a half up to twenty per cent. Besides these, it is usual to bestow a measure of provisions upon the poor, at the end of the sacred month of Ramadan.

The duty of fasting follows. [*Fasts*.] During the whole month of Ramadan, the Moslem is commanded to refrain from eating, drinking, smoking, smelling perfume, bathing, and every unnecessary indulgence in worldly pleasure, from day-break until sunset. From that period till the morning, he is allowed to eat, drink, and enjoy himself. The Arabian years being lunar, it often happens that the Ramadan falls in midsummer, when the fasting, more especially the abstaining from drinking, is excessively mortifying. None are exempt from this duty save the sick, travellers, and soldiers in time of war; but they are bound to fast an equal number of days during some other months. Nurses and pregnant women are entirely free from fasting. It is Mohammed's special and express desire, that no one should fast who is not quite equal to it, lest he might injure his health, and disqualify himself for necessary labor. Of the other commendable fast-days, the *Ashura*, on the 10th of Moharram (the Jewish *Yom Kippur*), deserves special mention. There are very few Moslems who do not keep the Ramadan, even if they neglect their other religious duties; at all events, they all pretend to keep it most strictly, fasting being considered "one-fourth part of the faith," nay, "the gate of religion."

Of the fourth paramount duty of the Mohammedan—viz., the pilgrimage to Mecca—we have spoken both under that heading, and, more fully, in the article *HAJJ*. Suffice it here briefly to recapitulate, that the *Kaaba* (q. v.) is to be encompassed seven times, the celebrated black stone being kissed at each round, that Mount Arafat is to be visited, the sacrifice *El-Fida* (the Ransom, in memory of Isaac's sacrifice) to be performed, and a number of minor ceremonies to be gone through by the pilgrim, and that he who neglects to perform the sacred pilgrimage, "might as well die a Jew or a Christian."

To the "positive" ordinances of Islam may also be reckoned the "*Saghir*," or minor, and "*Kehir*," or great festivals, [*Festivals*.] The first (*Al-Fetr*, or breaking the fast), following immediately upon the Ramadan, begins on the first day of the month of Shawal, and lasts three days. The second (*Eed Al-Kurban*, or sacrifice) begins on the 10th of *Dhu'l Heggah*, when the pilgrims perform their sacrifice, and lasts three or four days. Yet, although intended to be the most important of the two, the people have in most places changed the order, and by way of compensation for the previous fast, they make the lesser festival which follows the Ramadan the most joyful and the longest of the two. The day set aside for the weekly day of rest is the Friday—not, as is generally supposed, because both the Jewish Sabbath and the Christian Sunday were to be avoided, but because, from times long before Mohammed, the people used to hold public assemblies for civil as well as religious purposes on that day. The celebration of the Moslem day of religious solemnity is far less strict than is the custom with the other Semic religions. Service being over, the people are allowed to return to their worldly affairs, if they cannot afford to give themselves up entirely to pleasure or devotion for the rest of the sacred period.



Thus far, briefly, the principal positive laws of Islam relating to faith and practice. We shall now touch upon the fundamental prohibitory laws contained in the Koran.

First of all, the drinking of wine, which includes all strong and inebriating liquors, as giving rise to "more evil than good," is rigorously forbidden; and although of late, chiefly through European influence, very many Moslems have lost their religious scruples on that score, and not only secretly, but openly indulge in spirits, yet the great bulk of the faithful refuse even to make use of the proceeds of the sale of wine or grapes. Some over-scrupulous believers even include opium, coffee, and tobacco in the prohibition; but general practice has decided differently. The prohibitory laws respecting food resemble closely those of Judaism: blood, the flesh of swine, further, animals which have died from disease or age, or on which the name of some idol has been invoked, or which have been sacrificed unto an idol, or which have been strangled or killed by a blow, a fall, or by some other beast, are strictly forbidden. "Pure" animals must be slaughtered according to certain fixed rules, and the name of God is to be invoked before the operation, without, however, the usual addition of the benevolent epithets, since these would ill befit the sufferings of a fellow-creature. Fish, birds, game are mostly allowed for food, yet there are in nearly all cases certain religious ceremonies to be observed, before they become fit for the believer's table.

All games subject to chance ("casting lots by arrows")—such as dice, cards, tables, bets, &c.—are considered so wicked, that a gambler's testimony is invalid in a court of law. (The Talmud only rejects the testimony of the habitual "*dice*." [Kabbia, i. e., Cube] gambler and better upon doves.") Chess and other games depending on skill—provided they do not interfere with the regular performance of religious duties, and that they are played without any stakes whatsoever—are allowed by the majority of Moslem theologians. Usury is strictly prohibited. Taking interest upon any loan, however large or small, or profiting in trade through any questionable means, save by buying and selling, is severely condemned.

To prevent the faithful from ever falling back into idolatry, the laws relating to images and pictures have been made very stringent. Whosoever makes an imitation of any living being in stone, wood, or any other material, shall, on the day of judgment, be asked to endow his creation with life and soul, and, on his protesting his inability of doing so, shall undergo the punishment of hell for a certain period.

The civil and criminal laws of Mohammedanism, founded both on the Koran and the Traditions (*Sunna*), are, in some instances, where the letter of the written or oral precept allows of various explanations, or where the case in question is not foreseen, interpreted according to the opinion of one of the four great masters of Islam: Abu Hanifa, Malec Ibn Ans, Shâfi, Ibn Hanbal, within the pale of their respective sects. The principal points, however, upon which all Mohammedans agree are the following: Polygamy is allowed, not, as is commonly supposed, without any restriction, but: "Take in marriage of the women who please you, two, three, or four; but if ye fear that ye cannot act equitably, one; or those whom your right hands have acquired"—i. e., your slaves. These are the explicit words of the Koran (iv. 3), so that four wives, and a certain number of concubine slaves, is the whole extent to which a Moslem may legally go. The Prophet's example proves nothing to the contrary, since he was endowed with special privileges, and not subject to the common law in many respects. It is, moreover, added, as an advice, that to marry one or two is quite sufficient for a man, if he apprehend any inconvenience from a larger number of wives. A Moslem may, if urged by excessive love, or if unable to obtain a wife of his own creed, marry a Christian woman or a Jewess, but a Mohammedan woman is not, under any circumstances, to marry an unbeliever. In all cases, however, the child born of a Moslem, whatever the mother's faith, is a Moslem; nor does the wife, who is an unbeliever, inherit at her husband's death. Forbidden degrees are: the mother, daughter, sister, half-sister, aunt, niece, foster-mother, or a woman related to the faithful "by milk in any of the degrees which would preclude his marriage with her, if she were similarly related to him by consanguinity;" the mother of his wife, even if he be not properly married to the latter yet; the daughter of his wife, if the latter still be his legal wife; his father's wife and his son's wife; or two sisters at the same time; or wives who stand to each other in the relation of aunt and niece;

or the unemancipated slave, or another man's slave, if he have already a free wife. A simple declaration of a man and woman at the age of puberty, before two witnesses, of their intention to marry each other, and the payment of part of the dowry (which is indispensable, and must amount to at least ten dirhems, or about five shillings), is sufficient for a legal marriage. A girl under age is given away by her natural or appointed guardian, with or without her consent. To see the face of any woman who is neither his wife nor his concubine, nor belongs to any of the forbidden degrees, is strictly forbidden to the believer. Divorce is a comparatively light matter with the Mohammedans. Twice, a man may send away his wife and take her back again without any ceremony; the third time, however—if he unite the triple divorce in one sentence at once—he dare not receive her again in wedlock until she have been married properly to another man in the meantime. Mere dislike is sufficient reason for a man to dissolve the conjugal ties, and his saying: "Thou art divorced," or "I divorce thee," together with the payment of part of the wife's dowry, is all that is required from him by the law. A wife, on the other hand, is bound to her husband for ever, unless she can prove some flagrant ill-usage or neglect of conjugal duty on his part; and even then, she forfeits part, or the whole of her dowry. A divorced woman is obliged to wait, like a widow, for a certain period before marrying again: if pregnant, until delivery; three months, or four months and ten days, according to circumstances. If she have a young child, she is to suckle it until it be two years old, and the father is to bear all the expenses of the maintenance of mother and child. A woman proving disobedient to her husband, may be declared by the kadi "nāshizeh," i. e., rebellious, and the husband is no longer bound to maintain her. Yet, he cannot be forced to divorce her under these circumstances, so that the woman is generally in so sore a plight that she is obliged to promise good-behavior for the future, and the husband has then either to take her back to his house, or to set her free by a formal divorce. On the other hand, it often happens that a woman prefers a mere separation, to continuing to live with her husband; in which case she gets herself, of her own accord, inscribed a "nāshizeh." If a slave becomes a mother by her master, and he acknowledges the child to be his own, the latter is free, and the mother is to be emancipated at the master's death, and may not be given away, or otherwise disposed of by him, during his lifetime. A free person, wishing to marry his or her slave, must first emancipate this slave; and if the slave of another person has been married by a free man or woman, and afterwards becomes the latter's property, the marriage becomes illegal, and can only be renewed by a legal contract and emancipation.

The privilege of primogeniture does not exist in the Mohammedan law, but males generally receive a double share. A person may not bequeath more than one-third of his property, unless there be no legal heirs. Children, whether begotten with the legal wife, or slave, or concubine, or only adopted, and their descendants, are the first heirs; next come the claims of wives, parents, brothers, sisters, in their order. When there is no legal heir, the property falls to the crown.

The law is very lenient towards debtors, the Koran recommending the creditor to remit a debt "as alms." Insolvency and inability to work for the discharge of the claim, solve all further obligations. The most conscientious performance of all private contracts, however, is constantly recommended in the Koran.

Murder is either punished with death, or by the payment of a fine to the family of the deceased, according to their own pleasure. There must, however, be palliating circumstances in the latter case. The Bedawis, however, have expanded the law of blood-revenge in a terrible manner, and up to this day the "vendetta" often rages not only between family and family, but between whole tribes, villages, and provinces. Unintentional homicide is expiated by freeing a believer from slavery, and paying to the family a certain sum in proportion to the rank and sex of the deceased. He who has not the means of freeing a believer, is to fast for two months, by way of penance. According to the strict letter of the law, a man is not liable to capital punishment for killing his own child or an infidel; but, practically, no difference is generally made by the Mohammedan governments (chiefly the Turkish) in our day. Murder is punished with death, and no fine frees the culprit.

The Mosaic law of retaliation, in case of intentional wounds and mutilation, holds good also for Islam; that is (not, as has ignorantly been supposed, that the

corresponding limb of the offender is to be cut off, a certain proportionate fine in money is to be paid to the injured. The payment for any of the single limbs of the human body—e. g., the nose—is the full price of blood, as for a homicide; for a limb which is found twice, like hand or foot, half; for a finger or toe, the tenth part, &c. Women and slaves have smaller claims. Injuries of a dangerous, or otherwise grievous nature, pay the full price; those of an inferior kind, however, bring the perpetrator within the province of the lash or cudgel, which is supposed to have “come down from heaven, to be used by the judge for the promotion of virtue and duty.”

The Koran orders theft—of no less than the value of half-a-crown—to be punished by cutting off the chief offending limb: the right hand; the second theft is punishable by the loss of the left foot; the third, of the left hand; the fourth, of the right foot, &c.; but the ordinary punishments of imprisonment, hard labor, and the bastinado, have been substituted in our days. The property stolen must not, however, have been of easy access to the thief, nor must it have consisted of food, since he may have taken this to satisfy the craving of his hunger.

Unchastity on the part of a woman was, in the commencement of Islam, punished by imprisonment for life, for which afterwards, however, stoning was substituted in the case of a married woman; and a hundred stripes and a year's exile in the case of an unmarried free woman; a slave to undergo only half of that punishment. Yet, it is necessary that he who accuses a “woman of reputation” of adultery or fornication, shall produce four (male) witnesses, and if he be not able to do so, he is to receive fourscore stripes, nor is his testimony ever after to be received, for he is considered an “infamous prevaricator”—unless he swear four times that he speaks the truth, and the fifth time imprecate God's vengeance if he speak false. Yet, even this testimony may be overthrown by the wife's swearing four times that he is a liar, and imprecating the fifth time the wrath of God upon herself, if he speak the truth. In the latter case, she is free from punishment; the marriage, however, is to be dissolved. Fornication in either sex is, by the law of the Koran, to be visited with a hundred stripes.

Infidelity, or apostasy from Islam, is a crime to be visited by the death of the offender, if he have been warned thrice without recanting. Severer still, that is, not to be averted by repentance or revocation of any kind, is the punishment inflicted for blasphemy—against God, Mohammed, Christ, Moses, or any other prophet. Instantaneous death is the doom of the offender; for if apostasy may be caused by error and misguidance, “blasphemy is the sign of complete wickedness and thorough corruption of the soul.”

A further injunction of the Koran, for the carrying out of which, however, the time has well-nigh gone by, is that of making war against the Infidels. He who is slain while fighting in defence and for the propagation of Islam, is reckoned a martyr; while a deserter from the holy war is held up as an object of execration, and has forfeited his life in this world as well as in the world to come. At first, all the enemies taken in battle were ruthlessly slain; later, however, it became the law to give the people of a different faith against whom war was declared the choice of three things: either to embrace Islam—in which case they became Moslems at once, free in their persons and fortunes, and entitled to all the privileges of Moslems; or to submit to pay tribute—in which case they were allowed to continue in their religion, if it did not imply gross idolatry or otherwise offended against the moral law; or to decide the quarrel by the fortune of war—in which case the captive women and children were made slaves, and the men either slain, unless they became converts at the last moment, or otherwise disposed of by the prince. The fifth part of the spoil belongs “to God,” that is, the Sanctuary (Kaaba, &c.), to the apostle and his kindred, to the orphans, the poor, and the traveller.

We need hardly urge, that the Koran is not a systematically arranged code, and that all the laws and regulations hitherto enumerated, although contained in it, either bodily, or, as it were, in germs—further developed by the Sunna (q. v.)—are to a great extent only mentioned in an incidental manner, thrown together and mixed up, often in the strangest manner, with the most heterogeneous dicta, dogmas, moral exhortations, civil and criminal laws, &c., and are principally to be considered as supplementary to the existing laws and regulations which they either abrogated, confirmed or extended, according to the pressing demand of circumstances during

the Prophet's life. In cases for which subsequent ages found no written rules laid down by the Prophet, traditional oral dicta were taken as the norm, and later still, precedents of the Khalifs were binding. Hence contradictions in theory and practice have crept in, according to the different traditions and decisions of the Imams or expounders of the Law, besides the various interpretations put upon the book itself within the pale of the different Mohammedan sects. The secular tribunals, therefore, not unfrequently differ in their decisions from the judicial tribunals; and the distinction between the written civil Law of the ecclesiastical courts and the common Law, aided by the executive power, is, fortunately for the cause of human culture, and the spread of civilisation, getting clearer and clearer every day.

That part of Islam, however, which has undergone (because not to be circumscribed and defined by doctors) the least changes in the course of time, and which most distinctly reveals the mind of its author, is also its most complete and its most shining part—we mean the ethics of the Koran. They are not found, any more than the other laws, brought together in one, or two, or three Surahs, but “like golden threads” they are woven into the huge fabric of the religious constitution of Mohammed. Injustice, falsehood, pride, revengefulness, calumny, mockery, avarice, prodigality, debauchery, mistrust, and suspicion are inveighed against as ungodly and wicked; while benevolence, liberality, modesty, forbearance, patience and endurance, frugality, sincerity, straightforwardness, decency, love of peace and truth, and above all, trusting in God, and submitting to his will, are considered as the pillars of true piety, and the principal signs of a true believer. Nor must we omit to point out expressly that Mohammed never laid down that doctrine of absolute predestination and “fatality” which destroys all human will and freedom, since the individual's deeds cannot alter one iota in his destiny either in this world or in the next. So far from it, foolhardiness is distinctly prohibited in the Koran (ii. 196). Caution is recommended. Prayer, the highest ceremonial law of Islam, is modified in case of danger. It is legal to earn one's livelihood on Friday after prayer, and to shorten the readings in the Koran for the sake of attending to business. All of which is enough to shew that the Moslem is not to expect to be fed pursuant to a Divine decree whether he be idle or not. On the other hand, a glance at the whole system of faith, built on hope and fear, rewards and punishments, paradise and hell, both to be man's portion according to his acts in this life, and the incessant exhortations to virtue, and denunciations of vice, are sufficient to prove that aboriginal predestination, such as St Augustine taught it is not in the Koran, where only submission to the Lord's will, hope during misfortune, modesty in prosperity, and entire confidence in the Divine plans, are supported by the argument, that everything is in the hands of the Highest Being, and that there is no appeal against His absolute decrees.

And this is one instance of the way in which most of Mohammed's dicta have been developed and explained—both by sectarians and enemies within and without Islam—in such a manner that he has often been made to teach the very reverse of what he really did teach; and thus monstrosities now found in his creed, if carefully traced back to their original sources, will, in most cases, be seen to be the growth of later generations, or the very things he abrogated. That, again, the worst side of his character, the often wanton cruelty with which he pursued his great mission, the propagation of his faith, should by his successors have been taken as a thing to be principally imitated, is not to be wondered at, considering how brilliant the results of the policy of the bloody sword had proved. Scarcely a century had elapsed after Mohammed's death, and Islam reigned supreme over Arabia, Syria, Persia, Egypt, the whole of the northern coast of Africa, even as far as Spain; and notwithstanding the subsequent strifes and divisions in the interior of this gigantic realm, it grew and grew outwardly, until the Crescent was made to gleam from the spires of St Sophia at Constantinople, and the war-cry “Allah il Allah!” resounded before the gates of Vienna. From that time, however, the splendor and the power of Mohammedanism began to wane. Although there are counted about 150 millions this day all over the globe who profess Islam, and although it is, especially at this present juncture, making great progress among the African races, yet the number of real and thorough believers is infinitely small; and since it has left off conquering, it has lost also that energy and elasticity which promises great things. Its future fate will depend chiefly, we should say, on the progress of Eu-

ropean conquest in the East, and the amount of Western civilisation which it will, for good or evil, import into those parts.

We cannot consider in this place what Islam has done for the cause of all humanity, or, more exactly, what was his precise share in the development of science and art in Europe. We refer to the special articles which treat of these subjects, and particularly to the biographies found in the course of this work of men eminent in every branch of human knowledge who have issued from the ranks of Islam. Broadly speaking, the Mohammedans may be said to have been the enlightened teachers of barbarous Europe from the 9th to the 13th century. It is from the glorious days of the Abbasside rulers that the real renaissance of Greek spirit and Greek culture is to be dated. Classical literature would have been irredeemably lost, had it not been for the home it found in the schools of the "unbelievers" of the "dark ages." Arabic philosophy, medicine, natural history, geography, history, grammar, rhetoric, and the "golden art of poetry," schooled by the old Hellenic masters, brought forth an abundant harvest of works, many of which will live and teach as long as there will be generations to be taught.

Besides the Koran, the Sunna, and the native (Arabic, Persian, Turkish, &c.) writers on the foregoing subject, we mention as further references the works of the European scholars Maracci, Hyde, Prideaux, Chardin, Du Ryer, Reland, D'Herbelot, Sale, De Sacy, Hammer, Burckhardt, Sprenger, Burton, Muir, Garcin de Tassy, Lane, Weil, Geiger, Nöldeke. See KORAN, MAHOMMED, SHITES, SHAFITES, SUNNA.

**MOHAMMEDAN SECTS.** "My community," Mohammed is reported to have said, "will separate itself into seventy-three sects; one only will be saved, all the others shall perish." This prophecy has been largely fulfilled. Even during the illness, and immediately after the death of the founder, many differences of opinion arose among his earliest adherents. We have endeavored to shew both under KORAN and MOHAMMEDANISM, how the fundamental book of Islam left certain points undecided by the very fact of its poetical wording, and how, further, the peculiarity of the Arabic idiom at times allowed many interpretations to be put upon one cardinal and dogmatic sentence. To add to this uncertainty, a vast number of oral traditions sprang up and circulated as an expansive corollary to the Koran. Political causes soon came to assist the confusion and contest, and religion was made the pretext for faction-fights, which in reality had their origin in the ambition of certain men of influence. Thus "sects" increased in far larger number even than the Prophet had foretold, and though their existence was but short-lived in most instances, they yet deserve attention, were it only as signs and tokens of the ever-fresh life of the human spirit, which, though fettered a thousand times by narrow and hard formulas, will break these fetters as often, and prove its everlasting right to freedom of thought and action.

The bewildering mass of these currents of controversy, has by the Arabic historians been brought under four chief heads or fundamental bases. The first of these relates to the divine attributes and unity. Which of these attributes are essential or eternal? Is the omnipotence of God absolute? If not, what are its limits? Further, as to the doctrine of God's predestination and man's liberty—a question of no small purport, and one which has been controverted in nearly all "revealed" religions—How far is God's decree influenced by man's own will? How far can God countenance evil? and questions of a similar kind belonging to this province. The third is perhaps the most comprehensive "basis," and the one that bears most directly upon practical doctrines—viz., the promises and threats, and the names of God, together with various other questions chiefly relating to faith, repentance, infidelity, and error. The fourth is the one that concerns itself with the influence of reason and history upon the transcendental realm of faith. To this chapter belong the mission of prophets, the office of Imam, or Head of the Church, and such intricate subtleties as to what constitutes goodness and badness; how far actions are to be condemned on the ground of reason or the "Law;" &c.

One broad line, however, came to be drawn, in the course of time, among these innumerable religious divisions, a line that separated them all into orthodox sects and heterodox sects; orthodox being those only who adopted the oral traditions, or Sunna (see SUNNITES).

Much more numerous than the orthodox divisions are the heterodox ones. Immediately after Mohammed's death, and during the early conquests, the contest was chiefly confined to the question of the Imamate. But no sooner were the first days of warfare over, than thinking minds began to direct themselves to a closer examination of the faith itself, for which and through which the world was to be conquered, and to the book which preached it, the Koran. The earliest germs of a religious dissension are found in the revolt of the Kharejites against Ali, in the 37th year of the Hedjrah; and several doctors shortly afterwards broached heterodox opinions about predestination and the good and evil to be ascribed to God. These new doctrines were boldly, and in a very advanced form, openly preached by Wâsil Ibn Atâ, who, for uttering a moderate opinion in the matter of the "sinner," had been expelled from the rigorous school of Baâra. He then formed a school of his own—that of the Separatists or Motazilites (q. v.), who, together with a number of other "heretical" groups, are variously counted as one, four, or seven sects.

We now come to the second great heretic group, the Sefatians. The Sefatians (attributionists) held a precisely contrary view to that of the Motazilites. With them, God's attributes, whether essential or operative, or what they afterwards called declarative or historical, i. e., used in historical narration (eyes, face, hand), anthropomorphisms, in fact, were considered eternal. But here, again, lay the germs for more dissensions and more sects in their own midst. Some taking this notion of God's attributes in a strictly literal sense, assumed a likeness between God and created things; others giving it a more allegorical interpretation, without, however, entering into any particulars beyond the reiterated doctrine, that God had no companion or similitude. The different sects into which they split were, first, the Aesharians, so called from Abul Hasan al Ashari, who, at first a Motazilite, disagreed with his masters on the point of God's being bound to do always that which is best. He became the founder of a new school, which held (1) that God's attributes are to be held distinct from his essence, and that any literal understanding of the words that stand for God's limbs in the Koran is reprehensible. (2) That predestination must be taken in its most literal meaning, i. e., that God preordains everything. The opinions on this point of man's free will are, however, much divided, as indeed to combine a predestination which ordains every act with man's free choice is not easy; and the older authors hold it as well not to inquire too minutely into these things, lest all precepts, both positive and negative, be argued away. The middle path, adopted by the greater number of the doctors, is expressed in this formula: There is neither compulsion nor free liberty, but the way lies between the two; the power and will being both created by God, though the merit or guilt be imputed to man. Regarding mortal sin, it was held by this sect, that if a believer die guilty of it without repentance, he will not, for all that, always remain a denizen of hell. God will either pardon him, or the Prophet will intercede on his behalf, as he says in the Koran: "My intercession shall be employed for those among my people who shall have been guilty of grievous crimes;" and further, that he in whose heart there is faith but of the weight of an ant, shall be delivered from hell-fire. From this more philosophical opinion, however, departed a number of other Sefatian sects, who, taking the Koranic words more literally, transformed God's attributes into grossly corporeal things, like the Mosshabehites, or Assimilators, who conceived God to be a figure composed of limbs like those of created beings, either of a bodily or spiritual nature, capable of local motion, ascent, or descent, &c. The notions of some actually went so far as to declare God to be "hollow from the crown of the head to the breast, and solid from the breast downward; he also had black curled hair." Another sub-division of this sect were the Jabarians, who deny to man all free agency, and make all his deeds dependent on God. Their name indicates their religious tendency sufficiently, meaning "Necessitarians."

The third principal division of "heretical sects" is formed by the Kharejites, or "Rebels" from the lawful Prince—i. e., Ali—the first of whom were the 12,000 men who fell away from him after having fought under him at the battle of Seffeln, taking offence at his submitting the decision of his right to the califate (against Moawiyah) to arbitration. Their "heresy" consisted, first, in their holding that any man might be called to the Imamate though he did not belong to the Koreish, nor was even a freeman, provided he was a just and pious man, and fit in every other respect. It also followed that an unrighteous Imam might be deposed, or

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even put to death; and further, that there was no absolute necessity for any Imam in the world.

Of the fourth principal sect, the Shītes, or "Sectaries," the followers of Ali Ibn Abi Tāleb, we have spoken under that special heading.

It remains only to mention a few of the many pseudo-prophets who arose from time to time in the bosom of Islam, drawing a certain number of adherents around them, and threatening to undermine the church founded by Mohammed, by either declaring themselves his legal successors, or completely renouncing his doctrines. The first and most prominent among these, was Mosaylima (q. v.). Next to him stands Al-Aswad, originally called Ashala, of the tribe of Ans, of which, as well as of that of a number of other tribes, he was governor. He pretended to receive certain revelations from two angels, Sohaik and Shoralk. Certain feats of legerdemain, and a natural eloquence, procured him a number of followers, by whose aid he made himself master of several provinces. A counter-revolution, however, broke out the night before Mohammed's death, and Al-Aswad's head was cut off; whereby an end was put to a rebellion of exactly four months' duration, but already assuming large proportions. In the same year (11 Hedjrah), but after Mohammed's death, a man named Toleha set up as prophet, but with very little success. He, his tribe, and followers were met in open battle by Khalid, at the head of the troops of the Faithful, and being beaten, had all finally to submit to Islam.

A few words ought also to be said regarding the "Velled Prophet," Al-Mokanna, or Borkal, whose real name was Hakem Ibn Hashem, at the time of Al-Mohdi, the third Abbaside calif. He used to hide the deformity of his face (he had also but one eye) by a gilded mask, a circumstance which his followers explained by the splendor of his countenance being too brilliant (like that of Moses) to be borne by ordinary mortals. Being a proficient in jugglery besides, which went for the power of working miracles, he soon drew many disciples and followers around him. At last he arrogated the office of the Deity itself, which by continual transmigrations from Adam downwards, had at last resided in the body of Abu Moslem, the governor of Khorassan, whose secretary this new prophet had been. The calif, finding him growing more and more formidable every day, sent a force against him, which finally drove him back into one of his strongest fortresses, where he first poisoned and then burned all his family; after which he threw himself into the flames, which consumed him completely, except his hair. He had left a message, however, to the effect that he would reappear in the shape of a gray man riding on a gray beast, and many of his followers for many years after expected his reappearance. They wore, as a distinguishing mark, nothing but white garments. He died about the middle of the 3d c. Hedjrah.

Of the Karmathians and the Ismailis, we have spoken under these special headings. We can scarcely enumerate among the prophets Abul Teyeb Ahmed Al-Motanebbi, one of the most celebrated Arabic poets, who mistook, or pretended to mistake, his poetical inspirations for the divine afflatus, and caused several tribes to style him prophet, as his surname indicates, and to acknowledge his mission. The governor of his province, Lâli, took the promptest steps to stifle any such pretensions in the bud, by imprisoning him, and making him formally renounce all absurd pretensions to a prophetic office. The poet did so with all speed. He was richly rewarded by the court and many princes for his minstrelsy, to which henceforth he clung exclusively; but the riches he thus accumulated became the cause of his death. Robbers attacked him while he was returning to his home in Kufa, there to live upon the treasure bestowed upon him by Adado'ddawla, Sultan of Persia.—The last of these new prophets to be mentioned is Baba, who appeared in Anasias, in Natolia, in 638 Hedjrah, and who had immense success, chiefly with the Turks, his own nation, so that at last he found himself at the head of nearly a million men, horse and foot. Their war-cry was, God is God, and Baba—not Mohammed—is his prophet. It was not until both Christians and Mohammedans combined for the purpose of self-defence, that this new and most formidable power was annihilated, its armies being routed and put to the sword, while the two chiefs were decapitated by the executioner.

**MO'HAWK**, a river of New York, United States, named from a tribe of Indians. It rises in Onondaga county, 20 miles north of Rome, and runs east-south-east into the

Hudson at Waterford, 10 miles above Albany. It is 135 miles long, and has numerous and picturesque waterfalls, especially at Little Falls, Cohoes, and Waterford, affording abundant water-power. In its populous valley are the Erie Canal and New York Central Railway.

**MOHICANS**, Mohegans, or Mahicans, once a powerful and warlike sun-tribe of North American Indians, of the great Algonquin family, which in the 17th c. inhabited the territory north-north-west of Long Island Sound, and east of the river Hudson, now included in the states of New York, Connecticut, and Massachusetts. Being compelled to give way to the conquering Iroquois confederacy, they retired to the valley of the Housatonic River in Connecticut, and were consequently one of the first tribes who came into collision with, and were dispossessed of their territory by the early British settlers. They subsequently lived dispersed among the other tribes, and all traces of them have now nearly disappeared. Their name has become widely known through Mr J. Fenimore Cooper's celebrated novel, "*The Last of the Mohicans*."

**MOHILEV**, or Mogilev, a government of European Russia, lying between Minsk and Smolensk, contains 18,500 English square miles, with a pop. (1870) of 947,625. The inhabitants are mostly Russians, though there are also many Russians, Germans, Jews, and even Bohemians. The country is generally a plain, with here and there an occasional undulation; the soil is very fertile, and the climate most agreeably mild. Agriculture has here reached a high degree of perfection, and the same may be said of arboriculture and horticulture. The natural pasturage is of fine quality, and affords abundant nourishment to immense herds of cattle. The forests are extensive. The country is watered by the Dnieper and its numerous affluents, which form the means of communication with the Black Sea ports, and of the transit of corn, timber, and masts, of which last large quantities are annually floated down to Kherson. Bog iron-ore is found in abundance. The inhabitants are celebrated for their activity and industry; and M., from its great natural advantages, has now become one of the richest provinces of Russia.

In early times, M. belonged to the territory of the Russian prince of Smolensk, but was subsequently conquered by the Grand Duke of Lithuania, and was, along with Lithuania, united to the kingdom of Poland. In 1773, it was seized by Russia at the first partition of Poland; and in 1796, was joined to the government of Vitebsk, under the name of *White Russia*; but since 1802, it has formed a separate government.

**MOHILEV**, or Mogilev, the capital of the government of the same name in European Russia, and one of the finest towns of Russia, is situated in the centre of the government, on the right bank of the Dnieper, 100 miles south-west of Smolensk. It is the seat of a Greek archbishop, and of the Roman Catholic primate of Russia and Poland, besides being the favorite residence of many of the Russian nobility. It possesses a fine Greek cathedral, built in 1780, 20 Greek, one Lutheran, and four Roman Catholic churches, several synagogues, and a variety of religious, educational, and charitable institutions. Its streets are wide, straight, and well paved, and there is a fine promenade bordered with trees, whence a beautiful view of the valley of the Dnieper is obtained. Pop. (1867) 83,922, of whom one-third are Jews. There is a large export trade to the chief ports of the Baltic and Black Seas.

**MOHILEV**, or Mogilow, a district town on the south-west frontier of the government of Podolia, European Russia, is situated on the left bank of the Dniester, 80 miles east-by-south from Kamlnetz. Pop. (1867) 9756. It carries on an active trade with the adjacent Russian provinces, and with the Turkish principalities of Moldavia and Wallachia. The climate is so mild, that silk and other products of warm climates are extensively produced.

**MÖHLER**, Johann Adams, one of the most distinguished modern polemical divines of the Roman Catholic Church, was born of humble parentage, at Igersheim, in Würtemberg, May 6, 1796. He received his early education at the gymnasium of Mergentheim, whence, in his 17th year, he was transferred, for the higher studies, to the Lyceum of Ellwangen; and soon afterwards entered upon the theological course in the university of Tübingen. He received priests' orders in 1819; and for



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a short time was employed in missionary duty; but in 1820, he returned to college-life, for two years was engaged as classical tutor; but, in 1822, the offer of a theological appointment in the university of Tübingen, finally decided his choice to the study of divinity. He was permitted, before entering on his studies, to spend some time in making himself acquainted with the routine of the theological courses of other universities—as Göttingen, Berlin, Prague, Vienna, and Landshut; and in 1823, he entered upon his new position. In 1828, in which year he was also admitted to the degree of Doctor of Divinity, he was appointed ordinary professor of theology. His earliest publication was a treatise “On the Unity of the Church” (1826), which was followed, in 1827, by a historico-theological essay on “Athanasius and the Church of his Time, in Conflict with Arianism.” But his reputation, both posthumous and among his own contemporaries, rests mainly on his well-known “Symbolism;” or, the Doctrinal Differences between Catholics and Protestants, as represented by their Public Confessions of Faith” (1832). This remarkable book at once fixed the attention of the theological world. It passed through five large editions in six years. It was translated into all the leading languages of Europe, and drew forth numerous criticisms and rejoinders, the most considerable of which is that of Dr F. C. Baur (q. v.), 1833. To this M. replied in 1834, by a work entitled, “Further Researches into the Doctrinal Differences of Catholics and Protestants.” The polemical bitterness evoked by these controversies made it desirable that M. should leave the university of Tübingen. He was invited to Breslau, and also to Bonn, but ultimately selected (1835) the university of Munich, then in the first flush of its efficiency, under King Louis. His first appointment was nominally the chair of Biblical Exegesis, but he really devoted himself to the department of Church History, in which his opening course was eminently successful; but, unhappily, a naturally delicate constitution began to give way under the constant fatigues of a student's life; and although he continued, under all these disadvantages, to maintain and to add to his reputation, and although, in 1837, the invitation to the Bonn professorship was renewed in still more flattering terms, he gradually sunk under consumption, and died April 12, 1839. His miscellaneous works were collected and published posthumously, in 2 vols. 8vo (1839—1840), by his friend, the now celebrated Dr Döllinger. M. may be regarded as at once the most acute and the most philosophical of the modern controversialists of his church. He deals more, however, with the exposition of the points and the grounds of the doctrinal differences of modern sects, than with the discussion of the scriptural or traditional evidences of the peculiar doctrines of any among them.

MOÏDORE, a former gold coin of Portugal, of the value of 4800 reis, or nearly 27s. sterling. It was also called *Lisbonine*.

MOÏRE, the French name (formerly *mohère*, and supposed to be taken from the Eng. *mohair*, which is itself probably of Eastern origin) applied to silks figured by the peculiar process called waterling. The silks for this purpose must be broad and of a good substantial make; thin and narrow pieces will not do; they are wetted, and then folded with particular care, to insure the threads of the fabric lying all in the same direction, and not crossing each other, except as in the usual way of the web and the warp. The folded pieces of silk are then submitted to an enormous pressure, generally in a hydraulic machine. By this pressure, the air is slowly expelled, and in escaping, draws the moisture into curious waved lines, which leave the permanent marking called waterling. The finest kinds of watered silks are known as *Moirés antiques*.—The same process has been applied to woollen fabrics called *Moreen*, which is only an alteration of the word *moire*.

MOÏRÉE MÉTALLIQUE, a French term applied to tin-plate upon which a peculiar figuring like that caused by frost on windows is produced by dipping plates, in a heated state, into nitro-muriatic acid, and then washing with water, to remove the acid. When dry, the plates are varnished or lacquered, and have a pretty effect. The cheapness and ease of the process have made it very common for inferior articles in tin.

MOISSAC, a town of France, in the department of Tarn-et-Garonne, on the river Tarn, 15 miles north-west of Montauban. The church of St Pierre dates from the year 1100, and contains some excellent carvings and curious fantastic sculptures. M. is the centre of an important trade in grain. Pop. (1872) 4837.

**MOLA**, a city and seaport of the Italian province of Bari, delightfully situated among gardens and olive groves, on the Adriatic, 13 miles from Bari. It contains fine churches and other edifices, and excellent streets. From all accounts, it seems to have exceedingly little trade of any kind. Pop. 12,181.

**MOLA'SSES**. See **SUGAR**.

**MOLD** (anciently *Monte Alto*; Welsh, *Wyddgrug*), a parliamentary borough in the county of Flint, situated on the Alun, 12 miles west-south-west of Chester. Though Flint is the county town, the assizes and quarter-sessions for the county are held here. The town possesses a good market, a fine old church, and several dissenting chapels. It is connected with England by a branch of the Chester and Holyhead Railway. The neighborhood abounds with mineral wealth, coal and lead being the principal produce; it has also numerous interesting relics of antiquity—e. g., so-called Druidic circles, Roman roads and encampments, Saxon earthworks, an eminence called *Dryn Beili* (formerly surmounted by a castle), and a castellated building known as the Tower of Rhelwylt ab Gruffydd, the two latter having been scenes of frequent contentions between the English and Welsh. Many old families have mansions in the neighborhood, whose pleasing variety of scenery renders it attractive. Pop. of parliamentary borough (1871), 4534.

**MOLDAU** (Bohemian, *Vitava*), the chief river of Bohemia, and an important tributary of the Elbe, rises in the Böhmerwald Mountains, on the south-west frontier, at an elevation of 3750 ft. above the level of the sea, and flows s. e. to Hohenfurth, where it bends northward, and pursues that direction to its confluence with the Elbe opposite Melnik, after a course of 276 miles. Its course to the point of confluence is longer than that of the Elbe, and the navigation of that river is greatly facilitated by the body of water which it contributes. It receives on the left, the Wotawa and the Beraun; and on the right, the Luschnitz and the Sazawa. The chief towns on its banks are Krumau, Budweis, and Prague. It becomes navigable from Budweis.

**MOLDAVIA AND WALACHIA**, two states forming the so-called *Danubian Principalities*, which, since 23d December 1861, have been united under one prince and one administration, and officially bear the single name of **ROUMANIA or RUMANIA**. Their political relations have always been so close, that it has been considered best to describe them together. Reliable statistics as to the Dobrudscha (q. v.) granted at the Berlin Congress of 1878 in return for Rumanian Bessarabia (q. v.) ceded to Russia, are not yet forthcoming.

1. **MOLDAVIA** (Ger. *Moldau*, Turk. *Bogdan*) is bounded on the n. and e. by Russia, on the s. by Walachia, and the w. by Hungary. Area, since the cession of Bessarabia, about 15,000 sq. miles. The country forms, geographically, part of the great plain of South Russia, except towards the west, where there are spurs from the Carpathians. It is watered by the Pruth, the Sereth, and the Danube, and is almost everywhere fertile, producing considerable quantities of grain, fruit, and wine. But the riches of the country consist mainly in its cattle and horses, of which immense numbers are reared on its splendid and far-stretching pastures; swine and sheep are also numerous; and the rearing of bees, owing to the multitude of lime-trees, is extensively carried on. The great plagues of the land are locusts and earthquakes. Minerals and precious metals are said to be abundant, but they have not as yet been worked. There are only a few salt-pits near Okna, in the Carpathian Mountains. Trade is almost exclusively in the hands of the numerous Jews, Germans, Greeks, and Russians who have settled in the country. The capital of M. is Jassy (q. v.), but the great centre of trade is Galacz (q. v.), where, of late, several British merchants have established houses. The principal exports are grain, wool, lambs' skins, hides, feathers, maize, tar, tallow, honey, leeches, cattle, and salt (in blocks); the imports are chiefly the manufactured products of Western Europe. M. is divided into 13 districts, each of which has a prefect or governor, a receiver-general of taxes, and a civil tribunal, consisting of a president and two other judges.

2. **WALACHIA**, the larger of the United Danubian Principalities, is bounded on the n. by the Austrian empire and Moldavia, on the e. and s. by the Danube, and on the w. by the Austrian empire and the Danube. Length from the western frontier to Cape Kilia on the Black Sea, 805 miles; greatest breadth, 130 miles; area, 27,800 square miles. The greater part of W. is quite flat; but in the north, where it

borders on Hungary and Transylvania, it gradually rises up into a great mountain-wall, impassable save in five places. It is destitute of wood throughout almost its whole extent; and especially along the banks of the Danube, is covered with marshy swamps, miles upon miles in breadth. The principal river flowing *through* the country is the Aluta, which joins the Danube at Nikopol. The climate is extreme; the summer heats are intense; while in winter, the land lies under deep snow for four months. The principal products are corn, maize, millet, wine, flax, tobacco, and olive-oil. The vast treeless heaths afford sustenance to great herds of cattle, sheep, and horses. As in Moldavia, agriculture is an important branch of industry; and the swampy districts of the south are haunted by immense numbers of wild water-fowl. In minerals—especially gold, silver, copper, and rock-salt—the soil is rich, but only the last of these is extensively worked. Bucharest is the capital of Walachia and of Rumania. The pop. of Rumania, though the loss of Bessarabia was not balanced by the gain of the Dobrudscha, was still estimated in 1878 at near 5 millions.

*Administration.*—The ruler of the Principalities—styled by the Romans *Domnus* or *Domnitor*; officially called by the Sublime Porte, *Voivod* (Prince); by the Turks generally, *Hauer-Effendi* (Lord of the Unbelievers); and by the Russians, *Hospodar* or *Gosvodarj* (Prince)—receives his investiture from the sultan, but is otherwise independent. By the treaty of Paris (1856) and the Convention (1868), M. and W. were politically united under one prince, with a special ministry for each country, two elective assemblies, and a central commission, which had its seat at Fokshani. But in Nov. 1861, the sultan sanctioned the administrative union of the two states; and in the following month, it was publicly proclaimed at Bucharest and Jassy. The first ruler of Rumania, Prince Alexander John Couza, was forced to abdicate in 1866, when Karl I., son of the prince of Hohenzollern-Sigmaringen, was chosen his successor. At the same time, a new and more popular constitution was adopted by a constituent assembly elected by universal suffrage. The legislative power is vested in two houses, a senate and a chamber of deputies. The former consists of 76, and the latter of 157 members, of whom 82 are for W. and 75 for Moldavia. The members of both houses are chosen by indirect election—i. e., the first voters nominate electors, who chose the members. All citizens who have reached their 25th year, and who can read and write, are voters in the first instance, and every Ruman who possesses a small yearly income is eligible for a seat in parliament. The prince has a suspensive veto over all laws passed by both chambers. He is also chief of the executive, which is composed of a council of seven ministers, heads of the departments of the Interior, of Foreign Affairs, of War, of Finance, of Justice, of Commerce and Agriculture, and of Religion and Public Instruction. Judges are removable at the pleasure of the superior authorities. The legal codes are founded upon the civil law and the customs of the Principalities; but though the system of jurisprudence has been much amended, many reforms remain to be effected, especially in the administration of the laws, which is said to be most corrupt.

*Religion.*—The established religion of Rumania is that of the Greek Church, to which nearly the whole population belong; but all forms of Christianity are tolerated, and their professors enjoy equal political rights. At the head of the Greek clergy stand the metropolitan archbishops of M. and W., the latter of whom is primate of Rumania. Every bishop is assisted by a council of clergy, and has a seminary for priests; the superintendent of the preaching clergy is the *Proto-papa* of the diocese. The ecclesiastical wealth of the country was formerly very great, but the increased expenditure that followed the union of the two states rendered a scheme of spoliation the only means left to the government to extricate itself from its difficulties—in a word, the convent-properties were wrested from the hands of the Greek monks, and placed under the administration of the state. It had been the fashion to establish such convents in Turkey as supports to the orthodox faith, and the institutions in the Principality itself were richly endowed in land and other ways: it was resolved to apply the revenues to the relief of national needs, such as schools, hospitals, the support of the poor, &c., and to give only the overplus to the clergy. This has considerably increased the revenue of the state. The administration, however, is now put upon a better footing.

*Education.*—There are upwards of 2000 elementary schools, besides normal schools, gymnasia, private schools, &c., in all about 2500 schools. There are two universi-

tica. Education is gratuitous and compulsory. There are numerous French boarding-schools, and French is now the language of the educated circles, especially ladies (as Greek used to be), but the state language and the proper national tongue is the Rumanian.

**Army.**—The military force of Rumania is organised on the plan of the Russian army, and the staff officers are principally Russian. The militia is formed by the peasantry in the proportion of two men for every 100 families; but along the banks of the Danube, all the inhabitants capable of bearing arms are organised into a military force. By the law of 1872, all natives of Rumania from twenty to forty are liable to military service in the standing army, four years active and four in the reserve. The militia is composed of all who have been in the standing army at any age between twenty and thirty-six. In 1877 the entire Rumanian military force numbered 144,608 men, but of these only 42,449 belonged to the regular or "permanent" army.

**Commerce.**—The total value of the imports of Rumania in 1874 amounted to 92,000,000 lei (= a franc), or about £3,700,000; and of the exports, 158,000,000 lei, or about £6,320,000. The principal article of export is grain, especially wheat and maize. Rumanian industry has largely profited by the construction in recent years of several lines of railway. In 1869, the first line, 42 English miles in length, was opened from Bucharest to Giurgevo on the Danube, and in subsequent years a network of railways was completed, connecting the capital with Western Europe through the towns of Pivesti, Buzeo, Braila, Tekutch, Roman, and Suceava, and from thence to Lemberg, in Austria. In 1875 there were also 2360 miles of telegraph in the Principalities. The estimated revenue in 1876 was £3,915,000; the expenditure, £4,050,000; the public debt was in 1877 above £24,000,000.

**Race, Language, and Literature.**—The great majority of the inhabitants are known in Western Europe as Walachs, but they call themselves *Români*. The Walachs, however, are not confined to the Principalities, but inhabit also the southern part of Bukovina, the greater part of Transylvania, Eastern Hungary, a part of the Banat, Bessarabia, some districts in Podolia and Kherson, and portions of Eastern Serbia. They are also found in Macedonia, Albania, and Thessaly. They are a mixed race, produced by the amalgamation of the Emperor Trajan's Roman colonists with the original Dacian population, and subsequently modified by Grecian, Gothic, Slavic, and Turkish elements. This mixture is seen in their language, three-fourths of the words of which are Latin (the Dacian has disappeared), while the remaining fourth is made up of words from the other four languages. Walachian literature is rich in popular songs; since the 16th c., many works in prose and verse have been printed, and of late years, two political journals in the Walachian tongue have been established, one at Bucharest, and another at Jassy. A "Grammatica Daco-Romana" was published by Johann. Alexi (Vienna, 1826); and a "Historia Linguae Daco-Romanæ" by Laurianus (Vienna, 1849). A large Latin-Romanic-Hungarian Dictionary was carefully executed by the bishop of Fogarasz, Joh. Bob (3 vols. Kienzenburg, 1839).

**Social condition.**—Very recent statistics on this point are not attainable. In M., there are rather less, in W., considerably more than 8000 bojars, besides whom there is an extensive inferior nobility. In W., every twenty-eighth man is a nobleman; every one hundred and thirty-third, a merchant; and in the capital, every twentieth is a merchant. The free peasants, or yeomen, called *Rezeachs*, are not numerous—in all W., there are under 5000. Gipsy communities are an important element in the population; upwards of 150,000 of this mysterious race are, or were serfs belonging to the rich bojars and the monasteries. In 1844, about 80,000 were emancipated, and settled in colonies in different parts of the land: they call themselves *Românitchel* or *Români*. The common people are on the whole good-humored, frugal, sober, and cleanly; murder and larceny are almost unknown. Their dwellings, however, are, as may be supposed, of the most wretched description; composed chiefly of interlaced willow-witches, covered with mud, cane, and straw.

**History.**—In ancient times, M. and W. formed an important part of Dacia (q. v.), and the two countries have in general experienced the same vicissitudes. At the period of the migration of nations, and in the following centuries, they were the scene of the struggles between the Gothic, Hunnic, Bulgarian, and Slavic races—the Avari, Chazars, Petschenegi, Uzi, and Magyars, who alternately ruled or were

expelled from the country. These peoples all left some traces (more or less) of themselves among the Romanised Dacian inhabitants, and thus helped to form that composite people, the modern Walachs, who, in the 11th c., were converted to the Christianity of the Eastern or Greek Church. Their incursions, however, frightfully devastated the country. In the 11th c., the Kumans, a Turkish race, established in M. a kingdom of their own. Two centuries later, the great storm of Mongols broke over the land. It now fell into the hands of the Nogai Tartars, who left it utterly wasted, so that only in the forests and mountains was any trace left of the native Walachian population. In the latter half of the 13th c., a petty Walach chief of Transylvania, Radu Negru of Fogarasch, entered W., took possession of a portion of the country, divided it among his bojars (noble followers), founded a senate of 12 members, and an elective monarchy; and gradually conquered the whole of Walachia. Rather less than a century later (1354), a similar attempt, also successful, was made by a Walach chief of the Hungarian Marmarosch, of the name of Bogdan, to re-people Moldavia. In the beginning of the 16th c., both Principalities placed themselves under the protection of the Porte, and gradually the bojars lost the right of electing their own ruler, whose office was bought in Constantinople. After 1711, the Turks governed the countries by Fanariot princes (see FANARIOTS), who in reality only farmed the revenues, enriched themselves, and impoverished the land. In 1802, the Russians wrested from Turkey the right of surveillance over the Principalities. A great number of the nobles—through family marriages with the Fanariots—were now of Greek descent, the court-tongue was Greek, and the religious and political sympathies of the country were the same. Hence the effort of the Principalities in 1821 to emancipate themselves from Turkish authority, which was only the prelude to the greater and more successful struggle in Greece itself. In 1822, Russia forced Turkey to choose the princes or hospodars of W. and M. from natives, and not from the corrupt Greeks of Constantinople; and after 1829, to allow them to hold their dignity for life. The Principalities, united under one ruler in 1858, were brought under one administration in 1861. For subsequent history, see RUMANIA.

MOLÉ, Louis Matthien, Comte, a French statesman, and a descendant of the famous French statesman and magistrate, Matthien Molé (b. 1584; d. 1653), was born at Paris, 24th January 1781. His father, President of the Parliament of Paris, died by the guillotine in 1794. His mother was a daughter of Malesherbes. M. was for the most part his own preceptor, and displayed a wonderfully precocious love of hard work and independent reflection. In 1805, he published "*Essais de Morale et de Politique*," in which he vindicated the government of Napoleon on the ground of necessity. The attention of the emperor was drawn to him; he was appointed to various offices in succession, and raised to the dignity of a count, and to a place in the cabinet. After Napoleon's return from Elba, he refused to subscribe the declaration of the Council of State banishing the Bourbons for ever from France, and declined to take his seat in the Chamber of Peers. In 1815, Louis XVIII. made him a peer, and he voted for the death of Ney. In 1817, he was for a short time Minister of Marine, but afterwards acted independently of party, and was one of the principal orators in the Chamber of Peers. In 1830, he became Minister of Foreign Affairs in Louis Philippe's first cabinet, but only for a short time. In 1836, he succeeded Thiers as prime minister; but in the eyes of the liberal party, he displayed too entire a devotedness to the wishes of the king, and thus rendered his ministry very unpopular, so that in 1839 he felt it necessary to resign. In 1840, he was chosen a member of the *Académie Française*. From that time he took little part in political affairs, but after the revolution of 1848 exerted himself, but in vain, to rally and unite the party of order in the assembly to which he had been elected. He died at Champêtreux, 23d November, 1855. M. was fiercely attacked and abused in the latter part of his political career, but it is not now believed that he was servile towards the court. He detested anarchy, and believed in the necessity of a strong government; but he loved genuine liberty, and always placed the constitution above the king. When Louis Napoleon's *coup d'état* extinguished the republic, M. proudly said, that henceforth he could have nothing to do with politics.

MOLE (*Talpa*), a genus of quadrupeds of the order *Insectivora*, and family *Talpidae*. All the *Talpidae* live chiefly underground, and their structure is adapted to

their mode of life. In their general form, the character of their fur, the shortness of their limbs, the great muscular strength of the fore-parts, and great breadth of the fore-paws, the elongated head, the elongated and flexible snout, the smallness of the eyes, and the complete concealment of the ears, they all resemble the COMMON *M. (T. Europæa)*, with which also they pretty nearly agree in the nature of their food, their mode of seeking it, their dentition, and the shortness of their alimentary canal.—The Common *M.* is abundant in most parts of Europe, except the utmost north and utmost south. In Britain, it is very plentiful, except in the north of Scotland; but is not found in Ireland nor in some of the Scottish islands. Instead of its ordinary uniform black color, it is occasionally found yellowish white, or gray, and even orange. Its silky or velvety fur lies smoothly in every direction, the short hairs growing perpendicularly from the skin; a peculiarity which preserves it clean as the animal moves either backwards or forwards in its subterranean galleries. The fore-paws are not only very broad, but are turned outwards, for the better throwing back of the earth in burrowing. They are terminated by five long and strong claws. The phalangeal bones are remarkable for breadth, and an elongated bone of the carpus gives additional strength to the lower edge of the paw. The two bones of the fore-arm are fastened together. The shoulder-blades and the clavicles are very large; and the sternum has an elevated ridge as in birds and bats, for the attachment of powerful muscles. The muscles which move the head are also very powerful, and the cervical ligament is even strengthened by a peculiar bone; the *M.* making much use of its flexible snout in burrowing. The hinder limbs are comparatively feeble, and the feet small, with five toes. The eyes are black and very small, capable of being partially retracted and exerted. The senses of hearing, taste, and smell are very strongly developed in the mole. The cutting-teeth are very small and sharp; the canines long and sharp; the true molars broad, with many sharp conical elevations. This dentition adapts the animal for feeding not only on worms and grubs, but also on frogs, birds, and small quadrupeds, which accordingly are its occasional prey, although earthworms are its chief food. The *M.* is an excessively voracious animal; digestion is rapid, and so long an interval can be endured between meals, hunger soon ending in death. When pressed by hunger it will attack and devour even one of its own kind; and its practice is immediately to tear open the belly of any bird or quadruped which it has killed, and, inserting its head, to satiate itself with the blood. In eating earthworms, it skins them with remarkable dexterity. In quest of them, it works its way underground, throwing up the earth in mole-hills; more rarely in the fine nights of summer it seeks for them on the surface of the ground, when it is itself apt to be picked up by an owl equally in want of food. The habitation of the *M.* is of very remarkable construction: a hillock of earth larger than an ordinary mole-hill, and containing two circular galleries, one above the other, with five connecting passages, and a central chamber which has access to the upper gallery by three passages; whilst about nine passages lead away from the lower gallery in different directions. The end of a passage entering a gallery on one side is never opposite to the end of a passage entering on the other. To afford all facility of escape in case of any alarm, a passage leads at first downwards from the central chamber, and then upwards again till it joins one of the high roads which the *M.* keeps always open, which are formed by pressing the earth till it becomes smooth and compact, and are not marked by any mole-hills thrown up, and which not only serve for escape when necessary, but lead to those parts of the creature's appropriated domain where the ordinary mining for worms is to be prosecuted. The nest in which the female *M.* produces her young is not this habitation, but is formed generally under a mole-hill rather larger than usual, where two or three runs meet, and is lined with leaves and other warm materials. The *M.* breeds both in spring and autumn, and generally produces four or five young at a birth. The attachment of the parent moles seems to be strong, but transitory.

It has been sometimes alleged that moles eat vegetable as well as animal food, and that they are injurious to farmers, by devouring carrots and other roots; but it appears rather that they only gnaw roots when in the way of their mining operations, or perhaps, also, in quest of grubs which they contain. Moles are generally regarded as a pest by farmers and gardeners, owing to the injury which mole-hills do to lawns and pastures, the burying up of young plants, and the disturbance of their roots. But they are certainly of use in the economy of nature in preventing the

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excessive increase of some other creatures; and probably also contribute to the fertility of some pastures, by the continual tillage which they carry on. Mole-traps of various kinds are in use, which are planted, if the mole-catcher is skilful, in the often-traversed roads of the animals. Mole-catching has long been a distinct trade in Britain.

The name M. is abbreviated from the old English name *Mouldwarp*, or *Mouldiwarp*, still provincially used, and which is derived from the Anglo-Saxon *molda*, mould, and *weorpan*, to throw up.

Another species of M. (*T. cæca*) is found in the most southern parts of Europe; very similar to the Common M., but rather smaller, and having the eye always covered by the eyelid, so as to justify Aristotle's statement, that the M. is blind.—A species, also very similar to the Common M., is found in North America.

Among the other *Talpidae* are the CHANGEABLE M., or CAPE M. (*Chrysochloris Capensis*) of South Africa, which is remarkable as the only one of the mammalia that exhibits the splendid metallic reflections so frequently seen in some other classes of animals; the SKEW M. (q. v.) and the STAR-NOSE (q. v.) of North America.

MOLE. See NAEVUS.

**MOLE-CRICKET** (*Gryllotalpa*), a genus of insects of the Cricket (q. v.) family (*Achetidae* or *Gryllidae*), remarkable for burrowing habits, and for the great strength and breadth of the fore-legs. The other legs are also large and strong, but of the form usual in the family.—The best known species (*G. vulgaris*)—common in many parts of Europe, and pretty abundant in some places in England, but very local—is almost two inches long; of a velvety brown color; the wings, when folded, do not cover much more than one-half of the abdomen, although large when expanded. It uses its fore-legs not only for digging burrows in earth, but for cutting through or tearing off the roots of plants which come in its way. The M. feeds both on animal and vegetable substances, and often does no small injury to crops. The chirping, and somewhat musical call of the M., produced in the same way as that of the common cricket, is heard chiefly in the end of spring and beginning of summer, and only in the evening or at night. In some parts of England, this sound has gained the name of *Chur-worm*. Another local English name is *Croaker*.—The female M. prepares a curious nest, a rounded subterranean cell, about as large as a hen's egg, having a complicated system of winding passages around it, and communicating with it. In this cell, she deposits from 100 to 400 eggs. The young live for some time in society. They run actively, both in the larva and pupa states. The M. is very combative, and the victor generally eats the vanquished.—A species of M. (*G. didactyla*) does great injury to the plantations of sugar-canes in the West Indies.—A curious Indian insect, of a closely allied genus (*Schizodactylus monstrosus*), has prodigiously long wings, which, as well as the wing-covers, are rolled into spiral coils at the tips.

**MOLE-RAT** (*Spalax* or *Aepalax*), a genus of rodent quadrupeds of the family *Muridae*, having teeth almost like those of rats, but in many respects resembling moles, as in general form, shortness of limbs, concealment of ears, smallness or even rudimentary condition of eyes, and burrowing habits—although their food is altogether different, consisting wholly of vegetable substances, and chiefly of roots. One species (*S. typhlus*) inhabits the south of Russia and some parts of Asia. It is also known as the *Podolian Marmot*, *Blind Rat*, *Slepez*, *Zemni*, &c. The M. makes tunnels and throws up hillocks like the mole, but its hillocks are much larger.—Another species, found in the Malayan Archipelago, is as large as a rabbit.—Nearly allied is the COAST RAT or SAND MOLE of S. Africa (*Bathyergus maritimus*), also as large as a rabbit, with other species of the same genus, also natives of S. Africa, which drive tunnels through the sandy soil, and throw up large hillocks.

**MO'LESKIN** and **CO'RDUROY** are varieties of FUSTIAN (q. v.), a term which is used in a generic sense to include also velveteen, velveret, thick-set, thick-set cord, beaverteen, and other stout cotton cloths for men's apparel—a class of goods largely manufactured in Lancashire. The general structure of these fabrics is described under FUSTIAN and VELVET. They are, in point of fact, all of the nature of velvet, with a nap or pile on the surface, and most of them are twilled.

When cloth of this kind leaves the loom, its surface is covered with loops like

Brussels carpet, and these are then cut open with a ripping-knife of a peculiar shape, which the operatives learn to use with greasy dexterity. The hairy and uneven appearance which the cloth acquires in this operation is subsequently improved by the shearing process. The cloth is next steeped in hot water, to get rid of the paste used in dressing the yarn, and is then ready to be passed through the brushing or teasing machine, which consists of blocks of wood with concave surfaces covered with card-brushes, working backwards and forwards in a lateral direction against wooden rollers, encased in tin-plate, over which the cloth passes. The tin-plate is made rough with the burs of punched holes. In the next operation, the fustian is singed by passing the nap side quickly over a red-hot metal cylinder. The brushing and singeing are repeated three and occasionally four times to give the cloth a smooth appearance. It is then washed, bleached with chloride of lime, and dyed—usually of some shade of olive, slate, or other quiet color.

The different names given to fustian cloths depend upon their degree of fineness, and the manner in which they are woven and finished. Thus, smooth kinds, of a strong twilled texture, are called *moleskins* when shorn before dyeing, and *beavertons* when cropped after dyeing. Corduroy, or king's cord, is produced by a peculiar disposition of the pile-threads. In all fustians, there is a warp and weft-thread, independent of the additional weft-thread forming the pile; but in corduroys, the pile-thread is only "thrown in" where the corded portions are, and is absent in the narrow spaces between them.

Until a comparatively recent period, the quantity of fustian cloths annually consumed in the British Islands must have been very large, but the increased price of cotton, and the introduction of cheap woollen fabrics, have now very much curtailed the use of them. They are still, however, largely worn by certain classes of mechanics and laborers.

**MOLESTATION**, in Scotch Law, means disturbing the possession of heritage, and an action of molestation is a remedy for the trespass.

**MOLESWORTH**, Sir William, Right Honorable (eighth baronet), English statesman, was born in 1810. Lineally descended from an old Cornish family of large possessions (the first baronet was president of the Council in Jamaica in the time of Charles II., and subsequently governor of that island), he early shewed promise of distinction. His university career at Cambridge was, however, cut short by his sending (under circumstances of great provocation) a challenge to his tutor to fight a duel. He continued his education at the university of Edinburgh, and subsequently at a German university. After making the usual tour of Europe, he returned home, and threw himself, in 1831, into the movement for parliamentary reform. Next year, although only just of age, he was elected member of parliament for Cornwall (East). He sat for Leeds from 1837 to 1841, and then remained out of parliament four years, during which interval he used to say he gave himself a second and sounder political education. He was the intimate friend of Bentham and James Mill, and was regarded as the parliamentary representative of the "philosophical Radicals." Having been a great admirer of Hobbes, he accumulated materials for a life of the "Philosopher of Malmesbury," which remains in MS. uncompleted. In 1839, he commenced and carried to completion, at a cost of many thousand pounds, a reprint of the entire miscellaneous and voluminous writings of that eminent author. The publication was a valuable contribution to the republic of letters, and the works of Hobbes were placed by M.'s munificence in most of our university and provincial public libraries. The publication, however, did him great disservice in public life, his opponents endeavoring to identify him with the freethinking opinions of Hobbes in religion, as well as with the great philosopher's conclusions in favor of despotic government. In 1846, he was elected for Southwark (which he continued to represent until his death), and entered upon a parliamentary career of the greatest energy and usefulness. He was the first to call attention to the abuses connected with the transportation of criminals, and as chairman of a parliamentary committee brought to light all the horrors of the convict system. He pointed out the maladministration of the colonial office, explained the true principles of colonial self-government, prepared draught constitutions for remote dependencies, and investigated the true and natural relations between the imperial government and its colonial empire. M.'s views, although at first unpalatable to the legislature, have been adopted by successive administrations, and are now part



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and parcel of the colonial policy of Great Britain. In January 1853, he accepted the office of First Commissioner of Public Works, in the administration of the Earl of Aberdeen; and in 1855, the post of Secretary of State for the Colonies, in that of Viscount Palmerston. This appointment gave great satisfaction to our dependencies; but before he could give proof of his administrative capacity, he was (October 22, 1856) struck by the hand of death, while yet in the full vigor of life and intellect. He established the "London Review," a new quarterly, in 1835; and afterwards purchased the "Westminster Review," the organ of the "philosophical Radicals." The two quarterlies being then merged into one, under the title of the "London and Westminster," M. contributed to it many able articles on politics and political economy.

**MOLFE'TTA**, a city of Southern Italy, in the province of Bari, situated on the Adriatic, 18 miles n. w. of Bari; pop. (1872) 26,829. The neighborhood yields excellent fruits, especially almonds and oranges, and has extensive olive plantations. Fish abound along the coast. The city contains a magnificent cathedral, and is partly enclosed by walls; it is conjectured that it occupies the site of some early forgotten town, from the numerous vases, urns, and other relics of antiquity found in its vicinity.

**MOLIERE**, Jean Baptiste (properly, *Jean Baptiste Poquelin*—the name of Molière not having been assumed till he had commenced authorship), was born at Paris, 15th January 1622. His father, Jean Poquelin, was then an upholsterer, but subsequently became a valet-de-chambre to the king. Regarding the boyhood of M., almost nothing is known, but his credulous biographers have put together whatever traditionary gossip they could find floating on the breath of society. Voltaire, while recording these *contes populaires*, as he calls them, pronounces them *très-faux*. All that we really are certain of is, that in his 14th year he was sent to the Jesuit *Collège de Clermont* in Paris, where he had for a fellow-student Prince Armand de Conti, and that, on leaving the Collège, he attended for some time the lectures of Gassendi. He was charmed, we are told, by the freedom of thought permitted in speculative science, and, in particular, conceived a great admiration for Lucretius, the Roman poet-philosopher, whom he undertook to translate. Of this translation, only a single passage remains, intercalated in the "Misanthrope" (act II. scene 4.). About 1641, he commenced the study of law, and appears to have even passed as an advocate; but the statement of Tallement des Réaux that he actually ventured into the precincts of theology, is generally rejected. M. detested priests. So gay, humorous, and sharp-eyed a humanitarian would have felt quite miserable under the restraints of a monkish life. In 1645, he suddenly appeared upon the stage as a member of a company of strolling players, which took the name of the *Illustre Théâtre*, and performed at first in the faubourgs of Paris, and afterwards in the provinces. For the next 19 years we can only catch an occasional glimpse of him. He was playing at Nantes and Bordeaux in 1643, at Narbonne and Toulouse in 1649, at Lyon in 1653 (where his first piece, "L'Etonnadi," a comedy of intrigue, was brought out), at Lyon and Narbonne again in 1655, at Grenoble during the carnival, and also at Rouen in 1658. During these now obscure peregrinations, he seems, although an industrious actor, to have been also a diligent student. He read Plautus, Terence, Rabelais, and the Italian and Spanish comedies, besides—which, indeed, all the rest would have been of little avail—making a constant use of as quick eyes as ever glittered in a Frenchman's head. At Paris, by the powerful recommendation of his old schoolfellow, the Prince de Conti, M.'s company got permission to act before the king, who was so highly pleased, that he allowed them to establish themselves in the city under the title of the *Troupe de Monsieur*. In 1659, M. brought out "Les Précieuses Ridicules," the fine satire of which—lapsing at times, however, into caricature—was instantly perceived and relished. "Courage, Molière!" cried an old man on its first representation; "voilà la véritable comédie." The old man was a prophet. Veritable comedy dated in France from that night. Ménage, the critic, is reported to have said to Chaplain the poet, as they were going out of the theatre: "Henceforth (as St Remi said to Clovis), we must burn what we have worshipped, and worship what we have burned." In 1660 appeared "Sganarelle, ou le Cocu Imaginaire;" and in 1661, "L'Ecole des Maris"—

partly founded on the "Adelphi" of Terence, in which M. completely passes out of the region of farce into that of pure comic satire—and "Les Fâcheux." In the following year, M. married Armande-Grétiude Béjart, either the sister or daughter (for it is still undetermined) of Madeleine Béjart, an actress of his troupe, with whom he had formerly lived in what the French politely call "intimate relations." That, however, there is the slightest ground for supposing that the great comedian incestuously married his own daughter, nobody now believes, though the revolting calumny was freely circulated even in M.'s lifetime. His literary activity continued as brisk as before. Among several pieces belonging to this year, the most celebrated is "L'Ecole des Femmes," which excited, not without reason, the most violent indignation among the clergy and the devout, for there was an excessive indecency in the expression, and the author indulged in a caricature of religious mysteries that could not but be offensive. M. defended himself with incredible audacity in his "Impromptu de Versailles." "Le Tartufe," written in 1664, was prohibited from being brought upon the stage; but M. was invited by his literary friends, Boileau and others, to read it in a semi-public manner, which he did with the greatest approbation. In 1665, Louis XIV. bestowed a pension of 7000 livres on M.'s company, which now called itself the *Troupe du Roi*. Next year appeared "Le Misanthrope," the most artistic of all his comedies; shortly after followed by "Le Médecin Malgré Lui." When "Tartufe" was at last brought upon the stage in 1669, it obtained a superb success. The truth, the variety, the contrast of the characters, the exquisite art shewn in the management of the incidents, the abundance of the sentiments, and the wonderful alternations of feeling—laughter, anger, indignation, tenderness, make this, in the opinion of most critics, M.'s master-piece. To the same year belongs "L'Avare." In 1670 appeared "Le Bourgeois Gentilhomme," a very pleasant satire on a very prevalent vice among wealthy tradesmen—viz., the vulgar ambition to pass for fine gentlemen. Then came "Les Fourberies de Scapin" (1671), followed by "Les Femmes Savantes" (1672), full of admirable passages; and "Le Malade Imaginaire" (1673), the most popular, if not the best of all M.'s comedies. While acting in this piece, he was seized with severe pains, which, however, he managed to conceal from the audience; but on being carried home, hæmorrhage ensued, and he expired at ten o'clock at night (17th February 1673). As M. had died in a state of excommunication, and without having having received the last aids of religion—which, however, he had implored—the Archbishop of Paris refused to let him be buried in consecrated ground; but the king interfered—a compromise was effected, and he was privately interred in the cemetery of St Joseph, being followed to the tomb by a hundred of his friends with lighted torches. In 1792, his remains were transferred to the Museum of French Monuments, from which they were removed to Père Lachaise in 1817. M. ranks as the greatest French comic dramatist—perhaps the greatest of all comic dramatists. Among the best editions of M.'s works are those of Auger (1819—1825), Aimé-Martin (1833-6), Moland (1871), and Despois (1874 *et seq.*). A complete English translation of M.'s works is that by Van Laun, in 6 vols. (Edin. 1875-6). The best biographies are by Taschereau (1825-7), and Bazin (1851). The books devoted to M. and his works would themselves form a large library.

MOLINA, Louis, a celebrated Spanish Jesuit theologian, was born at Cuenca, in New Castile, in the year 1535; and having entered the Jesuit Society in his 18th year, studied at Coimbra, and was appointed Professor of Theology at Evora, where he continued to teach for 20 years. He died at Madrid in 1600, in the 65th year of his age. M.'s celebrity is mainly confined to the theological schools. His principal writings are a commentary on the "Summa" of St Thomas (Cuenca, 2 vols. 1593); a minute and comprehensive treatise "On Justice and Right" (Cuenca, 6 vols. 1593; reprinted at Maluz in 1659); and the celebrated treatise on "The Reconciliation of Grace and Free-will," which was printed at Lisbon in 1588, with an appendix, printed in the following year. Although it is to the last-named work that M.'s celebrity is mainly due, we must be content with a very brief notice of it. The problem which it is meant to resolve is almost as old as the origin of human thought itself, and had already led, in the 4th c., to the well-known PELAGIAN CONTROVERSY (q. v.). In reconciling with the freedom of man's will the predestination of the elect to happiness, and of the reprobate to punishment, M. asserts that the predestination is consequent on God's foreknowledge of the free determination of

man's will, and, therefore, that it in no way affects the freedom of the particular actions, in requital of which man is predestined whether to punishment or to reward. God, in M.'s view, gives to all men sufficient grace whereby to live virtuously, and merit happiness. Certain individuals freely co-operate with this grace; certain others resist it. God foresees both courses, and this foreknowledge is the foundation of one or of the other decree. This exposition was at once assailed in the schools on two grounds—first as a revival of the Pelagian heresy, inasmuch as it appears to place the efficacy of grace in the consent of man's will, and thus to recognise a natural power in man to elicit supernatural acts; second, as setting aside altogether what the Scriptures represent as the special election of the predestined, by making each individual, according as he freely accepts or refuses the grace offered to all in common, the arbiter of his own predestination or reprobation. Hence arose the celebrated dispute between the MOLINISTS and the THOMISTS. It was first brought under the cognizance of the Inquisitor-general of Spain, by whom it was referred to Pope Clement VIII. This pontiff, in 1597, appointed the celebrated congregation, *De Auxiliis*, to consider the entire question; but notwithstanding many lengthened discussions, no decision was arrived at during the lifetime of Clement; and although the congregation was continued under Paul V., the only result was a decree in 1607, permitting both opinions to be taught by their respective advocates, and prohibiting each party from accusing the adversaries of heresy. The dispute, in some of its leading features, was revived in the Jansenist controversy (see JANSEN); but with this striking difference, that whereas the rigorous Jansenists denied the freedom of the will when acted on by efficacious grace, all the disputants in the scholastic controversy—even the Thomists—maintain that, in all circumstances, the will remains free, although they may fail to explain how this freedom is secured under the action of efficacious grace. See AQUINAS.

MOLINISM, the name given to the system of grace and election taught by Louis Molina (q. v.). This system has been commonly taught in the Jesuit schools; but a modification of it was introduced by the celebrated Spanish divine Suarez (q. v.), in order to save the doctrine of *special election*. Suarez held, that although God gives to all grace absolutely sufficient for their salvation, yet he gives to the elect a grace which is not alone in itself sufficient, but which is so tempered to their disposition, their opportunities, and other circumstances, that they infallibly, although yet quite freely, yield to its influence. This modification of Molina's system is called CONGRUISM. Molinism must not be confounded either with Pelagianism or semi-Pelagianism, inasmuch as Molinism distinctly supposes the inability of man to do any supernatural act without GRACE (q. v.).

MOLINOS, Michael de, was born of noble parentage at Patencia, in the kingdom of Aragon, December 21, 1627. He received holy orders and was educated at Pampluna, and afterwards at Coimbra, at which university he obtained his theological degree. After a career of considerable distinction in his native country, M. went to Rome, where he soon acquired a high reputation as a director of conscience, and a master of the spiritual life. His private character was in keeping with this public reputation. He steadily declined all ecclesiastical preferment, and confined himself entirely to his duties in the confessional, and in the direction of souls. An ascetical treatise which he published, under the title of "The Spiritual Guide," added largely to the popularity which he had acquired in his personal relations; but there were not wanting many who, in the specious, but visionary principles of this work, discovered the seeds of a dangerous and seductive error. Among these, the celebrated preacher, F. Segneri, was the first who ventured publicly to call them into question; but his strictures were by the friends of M. ascribed to jealousy of the influence which M. had acquired with the people. By degrees, however, reports unfavorable to the practical results of this teaching, and even to the personal conduct and character of M., or of his followers, began to find circulation; and eventually, in the year 1685, he was cited before the Holy Office, and submitted to close imprisonment and examination. In addition to the opinions contained in his book, a prodigious mass of papers and letters, to the number, it is said, of 20,000, found in his house, were produced against him, and he was himself rigorously examined as to his opinions. The result of the trial was a solemn condemnation of sixty-eight propositions, partly extracted from his "Spiritual Guide," partly, it would appear, drawn from his papers or his personal professions. These doctrines

M. was required publicly to abjure, and he was himself sentenced to close imprisonment, in which he was detained until his death in 1696, when he had entered on his 70th year. The opinions imputed to M. may be described as an exaggeration of the worst and most objectionable principles of QUIETISM (q. v.). According to the propositions which were condemned by the Inquisition, M. pushed to such an extreme the contemplative repose which is the common characteristic of Quietism, as to teach the utter indifference of the soul, in a state of perfect contemplation, to all external things, and its entire independence of the outer world, even of the actions of the very body which it animates; inasmuch that this internal perfection is compatible with the worst external excesses. These consequences are by no means openly avowed in the "Spiritual Guide," but they appear to follow almost necessarily from some of its maxims, and they are said to have been plainly contained in the papers of M., which were produced at his trial, and to have been admitted by himself. After the death of M., no further trace of his teaching appears in Italy, but it was revived in more than one form in France.

MOLLAH, among the Turks, is the title of a superior judge. The Mollahs are divided into two classes: the first of these—four in number, from whom the Mollahs at the court of the Padishah are elected, possesses jurisdiction over the more important pashaliks (Adrianople, Brusa, Damascus, Cairo); and the second, who only hold their office for the space of a lunar month at a time, and the lowest rank of whom is formed by the ualhs, over the inferior provinces, towns, and villages. The Mollah is an expounder of civil and criminal law, and of the religion of the state; he is therefore necessarily both a lawyer and an ecclesiastic. Under him is the Cadi or judge, who administers the law, and superior to him are the Kadhiasker and the Mufti (q. v.). They all are, however, subject to the Sheikh Al Islam or supreme Mufti. In Persia, the office of mollah is similar to what it is in Turkey; but his superior is there the "Sadr," or chief of the Mollahs. In the states of Turkestan, the Mollahs have the whole government in their hands.

MOLLASSE, an extensive Miocene or Middle Tertiary deposit, occupying the central lake-region of Switzerland between the Alps and the Jura. It consists chiefly of a loose sand, but at the foot of the Alps it usually takes the form of a conglomerate called "Nagel-fine," which is said to attain the astonishing thickness of from 6000 to 8000 feet in the Righi, near Lucerne, and in the Speer, near Weesen. The mollasse contains a few shells and some vegetable remains, among which are several palms.

MOLLUSCA, one of the great animal sub-kingdoms, including so wide a range of distinct forms, that it is difficult to frame a definition that shall be applicable to all of them. The lowest forms, termed Polyzoa (q. v.) or Bryozoa, present so strong a resemblance to zoophytes, that until recently they were associated with the latter; whilst, on the other hand, in some of the most highly organised of this sub-kingdom, the Cephalopoda, there is a decided approximation towards the vertebrated series, as is shewn by the presence of a rudimentary cartilaginous skeleton, and by a peculiarity in the development of the embryo. The bilateral symmetry of external form which is almost universal in articulated and vertebrated animals, is here seldom met with; and taking them as a whole, the M. are characterised by the absence rather than by the presence of any definite form. The bodies of these animals are always of a soft consistence—a property to which they owe their name, which was devised for them by Cuvier, before whose time they were included in the *Ferme* of Linnaeus's arrangement. The *shell*, when it exists, is not to be regarded as an exo-skeleton giving attachment to muscles, and regulating the form of the animal, but merely as an appendage designed for the protection of the body from which it derives its shape; indeed, it is only where the body is uncovered by a shell, or where the locomotive organs can be projected beyond it, that any active movement can be effected. The whole fabric is enclosed in a thick, soft, flexible skin, called the *mantle*, and it is on the surface of this envelope that the shell is formed by the development and subsequent calcification of epithelial cells. In many of the M., the shell is composed of a single piece, which is usually a spiral tube, closed at one end, and gradually increasing in size towards the open extremity, from which the animal is able to protrude itself. Shells of this description are called *univalves*. In others, the shell is composed of two pieces or valves, attached to each other at one

point by a hinge, which is furnished with an elastic ligament that serves to open the valves, when it is not opposed by the action of the *adductor* muscles, whose office it is to keep the shell closed. Shells of this kind are termed *bivalves*. These differences in the character of the shell correspond with differences in the conformation of the animals inhabiting them. The bivalve *M.* exhibit no traces of a head, and hence are termed *Acephalous M.*; while the univalves have a distinct head, provided with organs of the special senses, and hence, by way of distinction, some writers have termed them *Cephalophora* (or head-bearing). Many *M.* are altogether unprovided with a shell, or have only a small calcareous plate embedded within the mantle. These are termed *naked mollusca*. It is worthy of notice that the young mollusc, while still in the egg, is almost always furnished with a delicate pellucid shell, even when it is ultimately to be naked, in which case the embryonic shell is cast off soon after the animal makes its escape from the egg. For the mode of formation, &c., of the shell, see *SHELL*.

The movements of many of the *M.* are executed by means of a muscular structure concentrated in some particular part or parts of the mantle, and termed the *foot*. In some (the *Gastropoda*), the foot forms a sort of flattened disc, by the alternate contraction and expansion of different parts of which the animal can slowly crawl forwards; whilst in others (the free-moving bivalves) it is a tongue-like organ, which can be protruded between the valves, and by its sudden extension, after being previously bent upon itself, can enable its possessor (the common cockle, for example) to take considerable leaps. The foot is also the agent by means of which certain species burrow in the sand or mud, and others bore into the solid rock. Many *M.*, however, are firmly attached to a single spot, except during their larval state; and as they do not require a foot, we find it either altogether undeveloped (as in the oyster), or serving to support a glandular organ, from which filaments of silky or horny matter (called the *bysium*) are secreted, which serve to attach the animal (the common mussel, for example) to rocks, stones, &c., beneath the water. Many of the subdivisions of the *M.* present modes of locomotion altogether independent of a foot, as, for example, the *Biphora*, which are described in the article *TUNICATA*; those bivalves which possess a branchial or respiratory chamber, into which water is drawn, and again expelled by muscular action, a recoil being thus produced which serves to drive the animal through the water; the *Pteropoda* (q. v.), which are furnished with a pair of broad flattened fins (which may possibly be regarded as a modified foot) at the sides of the head, by means of which they swim with tolerable rapidity; and the *Cephalopoda*, in which the mouth is surrounded by a number of arms, which serve not only as organs of motion, but for the capture of prey.

The *nervous system* in the *M.* is developed in accordance with two distinct types. In the lowest group of this sub-kingdom (the *Molluscoids*), there is only a single ganglion with afferent and efferent fibres radiating in every direction; while in the higher groups there are several ganglia lying somewhat irregularly in different parts of the body, and communicating by nervous threads with a larger mass placed in the head, or in the neighborhood of the œsophagus. This mass consists of several ganglia, which from their position are termed *supraœsophageal*, and is united by filaments with other ganglia lying below the œsophagus, so as to form a ring or collar around that organ. The supraœsophageal ganglia furnish the nerves to the special organs of the senses. Most of the *M.* possess special *organs of touch* in the form of lips or of special lobes around the mouth; of tentacles or arms upon the head, or of cirri upon other parts of the body; and in addition to these special organs, the skin appears to possess considerable sensibility. When tentacles are present, they are either two or four in number; and they can be protruded and retracted at pleasure, as every one must have noticed in the case of these organs (popularly known as *horns*) in the snail. *Organs of sight* are not universally present. In many *M.*, there is only a single rudimentary eye, while in others there is a large number of imperfect eyes (termed *ocelli*), which do not of necessity lie in the region of the head. In the higher *M.*, there are two eyes, sometimes placed directly on the head, and sometimes on the tentacles; and in the highest group (the *Cephalopods*), the eyes are as fully developed as in fishes.

*Organs of hearing*, in a simple form, are almost always present. They usually consist of round vesicles in the neighborhood of the œsophageal ring, from which

they receive a nervous filament. They contain a clear fluid and a small concretion of carbonate of lime, which is sometimes roundish, and sometimes of a crystalline form, and is in a perpetual state of vibration, in consequence of ciliary action in the interior of the vesicle. Whether there are any special *organs of smell and taste* in the M., is still undecided.

The organs of *vegetative life* (of digestion, circulation, &c.) are much more fully developed in the M. than those of *animal life*. The alimentary canal, which presents almost every variety of form from a simple cavity to a complicated intestine, is always provided with two distinct openings, a mouth and an anus, the latter being often situated (as in the Gasteropoda and Pteropoda) on the right side of the anterior part of the body. The liver is always present, existing in a mere rudimentary form in the Polyzoa, constituting a large part of the body in the acephalous bivalve M. (as the mussel and cockle), and a still larger part in the Gasteropoda (as the snail), while in the Cephalopoda it is constructed upon nearly the same plan as in fishes. Other secreting organs, such as salivary glands, pancreas, and urinary organs, are also present in the more highly developed mollusca.

The circulation of the blood is effected (except in the Polyzoa) by means of a distinct heart, which usually communicates with a regular, closed vascular system; but in some cases the venous system is imperfect, and the blood which has been transmitted by the arteries to the system in general is not confined within distinct vessels, but meanders through sinuses or passages excavated in the tissues, and through them it reaches the respiratory apparatus, whence it is transmitted by closed vessels (veins) to the heart. The blood is nearly colorless (sometimes of light blue or green tint), and contains but few floating corpuscles. In all but the very lowest M., there is a distinct respiratory apparatus, which, excepting in the case of the terrestrial Gasteropoda (as, for example, the snail), is constructed with a view to aquatic respiration, and is composed of *branchiæ*, or gills. These branchiæ usually consist of a series of membranous plates (arranged like the leaves of a book or the teeth of a comb), over which the water flows. They are sometimes attached to the surface of the body, but are most commonly enclosed within the mantle, or placed in a cavity in its interior called the branchial or respiratory chamber. In many of the bivalves, the openings for the ingress and egress of water are prolonged into tubes or syphons, which are sometimes of considerable length; the tube through which the water enters being termed the *oral* syphon, while that through which it escapes is termed the *anal* syphon. In all the aquatic M. except the Cephalopoda, the renewal of the water in contact with the surface of the gills is mainly due to ciliary action. In the air-breathing gasteropodous M. (of which the snails and slugs are well-known examples), there is a pulmonary sac or bag, into which the air penetrates by an opening on the right side of the body near the neck.

There are considerable differences in the modes of *propagation* of the mollusca. In the Molluscoids—the Polyzoa and Tunicata—there is both propagation by gemination (like that of Zoophytes, q. v.) and sexual reproduction, the sexes being distinct in the Polyzoa, and united in the same individual (constituting Hermaphroditism, q. v.) in the Tunicata. In the Lamellibranchiata, or bivalve M., and in the Cephalopoda, the sexes are separate; while in the Gasteropoda the sexes are most commonly separate, although a considerable number are hermaphrodites, which, however, require mutual impregnation to fertilize the ova. The eggs vary greatly in form; in some cases, they are laid separately, but most commonly they are agglutinated together in a mass; while in some marine species many eggs are enclosed in a leathery capsule, while numerous capsules are united to form a large mass. A comparatively few M. produce living offspring, the ova being retained in the oviduct until the extrusion of the young animals.

The M. are widely diffused through time and space. They were amongst the earliest animal inhabitants of our globe, and are everywhere found in fresh and salt water (except at great depths), and in every latitude of the earth. The great majority are marine animals, and it is in the tropical regions that the largest and most beautiful forms are developed. It is impossible to form even an approximate estimate of the number of mollusca. According to Leunis ("Synopsis der drei Natur-reiche; erster Theil," 1860, p. 77), there are 16,733 living, and 4590 fossil species, exclusive of Polyzoa; and it is probable that only a small proportion of the naked or shell-less M. is yet known.

Mollwitz  
Moloch

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The uses of many species of *M.* for food are too well known to require notice; and as bult for fishing, mussels and some other *M.* are of great value.

The animals of this sub-kingdom are divisible into the *Molluscoids* and the true *Mollusca*, the former being distinguished from the latter by the very low development of the nervous system, which is composed of only a single ganglion, giving off nerves in different directions; and by their propagating by gemination. The *Molluscoids* are divisible into: Class 1. *POLYZOA* or *BRYOZOA*. Examples—*Plumatella*, *Ficustra*. Class 2. *TUNICATA*. Examples—*Ascidia*, *Salpa*. The true *Mollusca* are divisible into: Class 3. *BRACHIOPODA* or *PALLIOBRANCHIATA*. Example—*Terebratulata*. Class 4. *LAMELLIBRANCHIATA*. Examples—*Oyster*, *Mussel*, *Cockle*. Class 5. *GASTEROPODA*. Examples—*Snail*, *Cowry*, *Limpet*, *Doris*. Class 6. *PTEROPODA*. Examples—*Clio*, *Hyalea*. Class 7. *CEPHALOPODA*. Examples—*Cuttle-fish*, *Nautilus*. The distinctive characters of these classes are given in separate articles.

The literature of this subject is very extensive. Amongst the most important works on the *M.* generally may be mentioned Cuvier, "Mémoires pour servir à l'Histoire et à l'Anatomie des Mollusques avec 85 pl." (Paris, 1817, 4to); Lamarck, "Hist. Nat. des Animaux sans Vertèbres," 2d edit., par Deshayes et Milne-Edwards (11 vols. 8vo); Woodward, "Manual of the Mollusca;" and the third volume of Bronn's great work, published at Leipzig in 1864, entitled "Classen und Ordnungen des Thierreichs;" while for information on the *M.* of Great Britain, the reader is especially referred to Forbes and Hauley, "Molluscan Animals and their Shells" (4 vols. 8vo); Gosse, "A Manual of Marine Zoology for the British Isles;" and Alder and Hancock, "Nudibranchiate Mollusca" (published by the Ray Society).

*Fossil Mollusca*.—The hard shells of most *M.* fit them for long preservation, and make them the most frequent organic remains in the fossiliferous rocks from the Silurian upwards. The tunicata and the nudibranchiate gasteropods, having no hard parts that could be preserved, are without fossil representatives; the glassy and translucent fragile shell of the pteropoda is only known fossil from a few species in the Tertiary strata; unless, indeed, the comparatively large forms (*Conularia* and *Theca*) from the older rocks have been rightly referred to this order. The remaining four orders—the Cephalopoda, Gasteropoda, Brachiopoda, and Lamellibranchiata—have existed together from the earliest period. The tetrabranchiate Cephalopoda were developed in great profusion and variety in the Paleozoic and Secondary periods; and as they decreased, the dibranchiate group took their place, and continued to increase in numbers until it reached its greatest development in the seas of our own day. Of the chambered shells like the pearly nautilus, it is estimated that over 1400 species are known, of which only five or six exist in the ocean now; the cuttle-fishes and squids, on the other hand, are represented in the Secondary and Tertiary rocks by about 100 species, while at least twice as many are known as living species.

The living Gasteropoda exceed the fossil in the proportion of 4 to 3. This disproportion will appear greater when we remember that the fauna of the present seas is set against the faunas of some thirty different periods, yet it must not be forgotten that we can never be acquainted with more than a fraction of the entire animal life of any bypast age. Almost contemporaneous with the first living organisms, this group has gone on increasing to the present time, when the numbers are so great that more than 8000 living species have been recorded. A genus of air-breathing univalves has been described by Lyell, from the coal-measures of Nova Scotia. A single species—a modern-looking *Phya*—has been obtained from the Purbeck limestone, the newest of the Secondary rocks. They are more frequent in Tertiary beds.

The Brachiopoda, or Lamp-shells, like the nautilus group, have their history chiefly written in the rocky tablets of the earth. Of 1800 known species, only 75 are living, and these are comparatively rare, or are at least found in inaccessible localities, whereas, in some periods of the earth's history, as when the chalk and mountain limestone beds were being formed, and especially during the Devonian period, the individuals abounded to an enormous extent. The genus *Lingula*, seven species of which live in the modern seas, can be traced through the intervening strata, down to the first fossiliferous bed, to which, indeed, it gives the name of "Lingula Bed;" but this species, though externally not to be distinguished from the existing shell, has a pedicle groove in the ventral valve—a character sufficient,

perhaps, for the establishment of a different genus. Indeed, none of the genera of the Palæozoic rocks still exist; the want of exact information is the only excuse for the continued application of the names of recent genera to the ancient inhabitants of the globe.

The *Couchifera* have been gradually increasing in numbers and importance from the earliest period, and they attain their maximum development in the existing seas. The more simple forms, with an open mantle, are common in the Palæozoic strata; the siphonated families, unknown in the older rocks, appear in considerable number in the Secondary strata, and continue to increase upwards. The recent species number about 3000, while the fossil are nearly twice as many.

**MO'LLWITZ**, a village of Prussian Silesia, in the government of Breslau, seven miles west of Brieg. Pop. 619. To the east of it lies the celebrated battle-field where Frederick II. of Prussia gained his first victory over the Austrians under Marshal Neipperg, April 10, 1741. According to the usual account, Frederick, on seeing his right wing and centre thrown into confusion and routed, put spurs to his charger, and fled from the field; but the advance of three battalions of Prussian infantry stopped the Austrians, while by this time Marshal Schwerin, who commanded on the Prussian left, routed the Austrian right wing, and compelled the whole to retreat. The Austrians suffered immense loss in killed, wounded, and prisoners. The immediate result of this victory was an alliance between France and Prussia, to dissolve which Austria was compelled to surrender the province of Silesia to Frederick, in 1743.

**MOLO**, a city of the Philippine Islands, on an island of the same name, four miles from Iloilo. See **PHILIPPINES**. In ancient times, it was a Chinese colony, and is now occupied by *Mestizos* and their descendants, most of them having a mixture of Chinese blood. Pop. 16,000.

**MOLOCH** (more correctly **MOLECH**), also **MILKOM**, **MALKOM** (*their king*), from Heb. *Melech*, king, the chief Ammonite deity (the Chemosh of the Moabites), whose worship consisted chiefly of human sacrifices, purifications, and ordeals by fire, mutilation, perpetual virginity, and the like; practices specially inveighed against in the Mosaic records. Even the stranger who should devote his offspring to this idol was to be put to death by stoning. It is not quite certain which was the particular manner of this sacrifice. Rabbinical tradition represents Moloch as a human figure of brass or clay, with a crowned bull's head, upon whose extended arms were laid the doomed children. A fire within the hollow statue soon scorched them to death, while their shrieks of agony were deadened by a loud noise made by the priests upon various instruments. But although this description nearly coincides with that of the statue of the Carthaginian Kronos, and although so late a traveller even as Benjamin de Tudela speaks of having seen the remains of an ancient Ammonite temple at Gehal, with the fragments of an idol somewhat corresponding to the above representation, yet nothing certain is known about this point at present; nay, even the burning of the children itself has been questioned; and it is contended, yet without much show of reason, that the victims were merely carried through two pyres of fire by way of solemn purification or baptism. It seems, however, certain that the worship of M. in whatever shape it may have been, was common throughout the Canaanite nations. The Carthaginians, through whom it was probably spread over the whole East, worshipped Kronos in rites of fire and bloodshed; and human beings, children or grown-up persons, prisoners or virgins, were either on certain periodical festivals, or on sudden emergencies, offered up throughout almost all the lands and islands which the merchant-people of antiquity may be supposed to have touched at. The description of the Kronian statue, as given by classical writers, differs only in that small respect from the one given above, that the child fell, according to the former, from the hands of the god into a burning fire below, instead of being slowly burned to death. On fire-worship in general, which is the main idea of "Moloch"—probably worshipped originally as the symbol of the sun—we have spoken under **GUEBRES**. The name itself gives no clue to its special nature, nor does any comparison with cognate roots lead any farther. Molech, or Melech, is the supreme king or deity of the people, who have enthroned him as their tutelary god. Naturally, the princes of Ammon are the princes of *Malcham*—their (the Ammonites') king or god, and his priests were high in social rank.



Moloch  
Moluccas

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Respecting the special history of this worship among the Israelites, we can only say that, although we do not see any more reason to presuppose its wide spread at early times (on account of the frequent occurrence of the word "king" in doubtful passages), than there is the slightest ground for assuming (as has been done by Danmer and others) that the whole Mosaic religion originated in a Moloch-service (a notion which hardly required a serious refutation for its instant explosion)—yet there is no doubt that it had its secret, although few adherents, even before the Canaanite women in Solomon's harem reintroduced it publicly. The Valley of Hinnom and the Mount of Olives were the chief places of these abominable rites; the former being afterwards adopted as the name for Hell, even in Islam. Not until the time of Josiah was it rooted out from among the people. The word has now become a designation for a kind of irresistible dread influence, at whose shrine everything would be sacrificed, even as the deluded father offered his own child to the terrible idol.

**MO'LOCH**, a genus of saurian reptiles, of the family *Agamidae* (see ΑΓΑΜΑ). *M. horridus*, an Australian species, is perhaps the most ugly and repulsive in appearance of all the saurian tribes. The whole surface of the body is covered with irregular plates and strong sharp spines; the upper surface of the head is crowned with two very large spines; and on the back of the neck are large rounded protuberances, covered with granular scales and spines. The *M.* is, however, a perfectly inoffensive creature.

**MOLO'GA**, a district town in the west of the government of Jaroslav, in European Russia, is situated near the confluence of the Mologa and Volga, 68 miles west-north-west of Jaroslav. It is a town of great antiquity, and first belonged to the principality of Rostof, afterwards to Yaroslaf, but from 1321 till 1471, it had its own princes. There was formerly an extensive fair at Mologa. The timber-trade, and the carriage of goods by river-boats and rafts, now occupy the majority of the inhabitants. Pop. (1867) 8715.—The river Mologa is one of the links between the Volga and the Neva.

**MOLTKE**, Hellmuth, Count von, Field-Marshal of the German empire, and chief of the general staff, who planned the Prussian campaign of 1866 against Austria, and the German campaign of 1870—1871 against France. He belongs to an old family, who had their seat for centuries in Mecklenburg, where *M.* was born, 26th October 1800. Soon after his birth, his father, a military officer, left Mecklenburg, and acquired an estate in Holstein. He and his brother were sent to the military academy in Copenhagen, where iron discipline and military frugality laid the foundation of his later character. In 1822, he entered the Prussian army as cornet. His parents having by this time lost all their fortune, he was left without any means whatever, and had to undergo many hardships to maintain himself in his position, from the very modest pay the Prussian officers receive; yet he managed to save enough to take lessons in modern languages, which afterwards proved of great advantage to him. His eminent abilities soon procured him a place in the general staff. The time between 1835 and 1839, he spent in Turkey and Asia Minor, whither he was sent by the Prussian government to report on the war between that country and Mehemet Ali. Several anonymous publications of his, descriptive of the country and the war, are worthy of notice. After his return, he rapidly advanced through the different stages to the rank of general, continuing, however, on the general staff. His wonderful strategical powers were of immense service in the wars with Denmark (1863—1864), Austria (1866), and France (1870—1871); bringing them all to triumphant issues. At the end of the Austrian war he was rewarded with the order of the Black Eagle, in 1870 he was created a count, and in 1871 he was raised to the rank of field-marshal. He published a work on the Franco-German War. *M.* is a man of great modesty and simplicity; he is reserved, and so little given to talk, that he has acquired the surname of "the Silent." The same composure and equanimity that he possesses in council, he also preserves in the heat of battle. See GERMANY.

**MOLU'CCAS**, or Royal Islands, properly so called are Ternate, Tidore, Makian, Motir, and Batjan, lying to the west of Gilolo, and washed by the Moluccas Strait or Passage, which separates Gilolo from Celebes.—Ternate, the most important, is a volcanic mountain with planes at its base. The top is in 0° 48' 80" n. lat., and 127° 20'

80' e. long. Area, 23½ sq. m. Pop. 8594, of whom 109 are Europeans. The town is on the east side and contains the sultan's palace, the Dutch residency, Protestant church, government school, &c. The island is fertile and well watered; the natives peaceful. They cultivate rice, cotton, tobacco, &c., trade with the adjacent islands, and build vessels, from the light skiff and the tent-boat to the war-galley of 60 or 80 rowers, carrying two or more pieces of light artillery.—Tidore is south of Ternate, its north point being 1° 11' n. lat., and 126° 1' e. long. Area, 33 sq. m. Pop. 8157. The island is a volcano, 5532 feet high, and fertile for 3000 feet. The natives are less gentle, but more industrious than those of Ternate, and diligently cultivate the soil, weave, and fish. They are Mohammedans, and have many mosques. The sultans of Ternate and Tidore are subsidised by and subject to the Netherlands, exercising their authority under the surveillance of the Resident.—Makian lies in 0° 18' 30' s. lat., and 127° 24' e. long., is very fertile, yields much sago, rice, tobacco, canary-oil, &c., and has important fishings. Pop. 5000. The natives are industrious, make good nets, spin yarns, and weave coarse striped fabrics.—Further north, in 0° 23' n. lat., and 127° 9' 30' e. long., is Motir, which formerly yielded a considerable quantity of cloves, and later, sent much earthenware to all the Spice Islands.

Batjan, the only remaining Royal Island, lies between 0° 18'—0° 55' s. lat., and 127° 22'—128° e. long., is 50 miles in length, and 18 in breadth, has many mountain peaks from 1500 to 4000 feet in height, the sources of numerous rivers. The greatest part of this beautiful island is covered with ebony, satin-wood, and other valuable timber trees, which give shelter to numerous beautiful-plumaged birds, deer, wild hogs, and reptiles. Sago, rice, coconuts, cloves, fish, and fowls are plentiful, and a little coffee is cultivated. Coal is abundant, gold and copper in small quantities. The inhabitants, 1800, who are lazy and sensual, are a mixed race of Portuguese, Spaniards, Dutch, and natives. These islands are all volcanic, Ternate being a mountain sloping upwards to 5563 feet, to which Tidore bears a striking resemblance. Makian is an active volcano, which, so late as December 1861, threw forth immense quantities of lava and ashes, by which 326 lives were lost and 15 villages in part or in whole destroyed. Motir is a trachyte mountain, 2296 feet in height; and Batjan, a chain with several lofty peaks. Total population of the M. Proper, 23,551.

To the south-west of Batjan lie the Obi group, consisting of Obi Major, Obi Minor, Typha, Gonoma, Pisang, and Maya, of which Obi Major, in 1° 35' s. lat., and from 127° to 128° e. long., is by far the largest, having an area of 598 square miles. It is hilly and fertile, being covered, like the smaller islands of the group, with sago and nutmeg trees. They are uninhabited, and serve as lurking-places for pirates and escaped convicts. In 1671 the Dutch built a block-house called the Bril; and a few years later, the Sultan of Batjan sold the group to them for 800 dollars; but the station being found unhealthy, the company abandoned it in 1788.

THE MOLUCCAS, or SPICE ISLANDS, in the broad use of the term, lie to the east of Celebes, scattered over nearly eleven degrees of lat. and long., between 3° s.—8° n. lat., and 126°—136° e. long., including all the territories formerly ruled over by the sultans of Ternate and Tidore. They are divided into the residencies of Amboyna (q. v.), Banda (q. v.), and Ternate; a fourth residency being Menado (q. v.). Over the northern groups of the Spice Islands, the Netherlands exercise an indirect government, the sultans of Ternate and Tidore requiring to have all their appointments of native officials ratified by the Resident. The southern groups are directly under European rule. The residency of Amboyna contains that island, sometimes called Ley-Timor, or Hitu, from the two peninsulas of which it is formed, Burn, the Uliassers group, and the west part of Ceram. That of Banda includes the Banda, Keffing, Key, Arru, and other islands, also the eastern portions of Ceram.

Under the residency of Ternate are placed the M. Proper, Gilolo, the neighboring islands, and the north-west of Papua. In 1871, pop. of the M. and dependencies, 4214 Europeans and 795,560 natives.

Amboyna, the Banda and Uliassers Islands, chiefly supply the cloves, nutmegs, and mace which form the staple exports. The Banda Islands are Neira or Banda-Neira, Grati Banda, Ay or Way, Rinn, Rozingain, and Goenong-Api, containing an area of 588 square miles. In 1857, pop. 6101, of whom 400 were Europeans; that of the whole residency, 110,802, including the eastern part of Ceram. The principal island of the group is Neira, south-east from Amboyna, in 4° 38' s. lat., and 130° e.

long., separated by narrow straits from Goenong-Api on the west, and Great Banda on the east. The coast is steep, and surmounted by several forts and batteries, which command the straits and roadstead. The town of Neira, on the south side of the island, is the capital of the Dutch residency of Banda, has a Protestant church, school, and hospital. The Banda Islands have a rich soil, and are planted with nutmeg-trees, producing, in 1860, upwards of a million lbs. of nuts, and 276,586 lbs. of mace. The culture has nearly doubled since 1851. Pine-apples, the vine, banana, cocoa-nut, and other fruit trees thrive, and are abundant. Ay is the prettiest and most productive of the group. Goenong-Api is a lofty volcano. There are wild cows, hogs, and deer; sea-carp and mackerel, which last are dried, and form with sago the food of the slaves. The east monsoon begins in May, and the west in December, and are accompanied with rain and storms. The climate is not particularly healthy.

The Ullassers, which with Amboyna, produce the cloves of commerce, are Saparoua, Oma or Haroukou, and Nouea-Laut. They lie to the east of Amboyna in 3° 40' s. lat., and 128° 33' e. longitude, and have an area of 107½ square miles. Saparoua is the largest, and is formed of two mountainous peninsulas, joined in the middle by a narrow strip of undulating grassy land. Recently there were about 100,000 trees, producing 185,000 lbs. of cloves. The population amounts to 11,685, of whom 7340 are Christians, and have 12 schools, with a very large attendance of scholars.—Oma, separated from Saparoua by a strait of a league in width, has eleven villages, of which Harouka and Oma are the chief. It is mountainous in the south, and has several rivers and sulphurous springs. The produce of cloves has amounted in one year to 40,000 lbs.; and the villagers possess 50,000 cocoa palms, besides other fruit-trees. The woods abound with deer and wild hogs, the rivers with fish. Sago is grown, but not in sufficient quantities to meet the wants of the people, who draw further supplies from Ceram. The beautiful village of Harouka, on the west coast, is the residence of the Dutch-Postholder, who is president of the council of chiefs. Here is the head office of the clove-produce. There are two forts on Oma, several churches, and six schools, with 700 pupils. Pop. 7188, one-half Christians, the other Mohammedans.—Nouea-Laut lies to the south-east of Saparoua. It is planted with clove-trees, which in one year produced 120,000 lbs. There are upwards of 30,000 cocoa-nut trees. The inhabitants, who formerly were pirates and cannibals, amount to 3479 souls, are all Christians, and have schools in every village—in 1859, they were attended by 870 pupils.

The clove-tree and the nutmeg are indigenous to all the Spice Islands, but the clove-cultivation is confined to Amboyna and the Ullassers, the nutmeg to the Banda Islands. Till 1834, the Dutch prohibited the planting of these trees in other parts, and caused those of native growth to be rooted out, in order to prevent smuggling, and to retain the supply of these spices to the European market. The Spice Islands are generally healthy both for Europeans and Asiatics; and though the plains are sometimes very hot, mountains are always near, where it is pleasantly cool in the mornings and evenings. Besides the spice-trees, the bread-fruit, sago, cocoa-nut, banana, orange, guava, papaw, also ebony, iron-wood, and other valuable timber-trees, are abundant. The natives of some of the islands are Alfouers, of others, Malays on the coasts, and Alfouers in the interior. In Ceram are also Papuan negroes, brought originally from Bali and Papua as slaves.

The Resident and other Dutch officials reside in the city of Amboyna, the streets of which are broad, planted with rows of beautiful trees, and cut each other at right angles. There are two Protestant churches, a town-house, orphanage, hospital, and theatre, besides a useful institution for training native teachers, with which is connected a printing-press. Near the city are beautiful promenades and country-seats. Pop. 10,500.

In 1554, the clove-produce amounted to 580,592 lbs., the number of trees planted being 405,639, of which one-third part were fruit-bearing; nutmegs, 587,861 lbs., and mace, 183,986 lbs.; the trees planted being 424,573, of which 297,373 were bearing. The total cost of the nutmegs and mace delivered in the Netherlands that year was £30,768 sterling, realising £94,466. In 1859, the M. sent to Java for the account of government, 2013 picols of mace (the picol = 138 lbs.), 81,101 of cloves, 6636 of nutmegs, and 28 of cocoa-nut soap; the value being £59,416. The produce of nutmegs, in 1851, was 463,309 lbs.; in 1859, it had risen to 832,634, and in 1867, to 1,044,657.

The clove-crop varies much, as the following table will shew: 1856, 617,250 lbs.; 1857, 187,098  $\frac{1}{2}$ ; 1858, 228,518; 1859, 890,888; 1860, 258,117. Amboyna and Banda have been free ports since 1864; but as government monopolises the labor, there is no fair competition, and the people are slaves of the soil, their chiefs being paid in proportion to the produce delivered.

In 1521, Antonio de Brito first appeared to take possession of the M. in the name of the king of Portugal; and after a long period of violence, intrigue and perfidy, the Portuguese were driven out by the Dutch and natives, at the beginning of the 17th century. The change was of no advantage to the natives, for the Dutch, having obtained the exclusive right of buying all the cloves, at a nominal value, a series of wars ensued, which resulted in the subjugation of the Spice Islands. Recently, new Sultans of Ternate and Tidore have been appointed, with less power than their predecessors; and the wars with the Alfoers of Ceram, in 1859 and 1860, have brought them more fully under Dutch rule.

**MOLYBDENUM** (sym. Mo; equiv. 48—new system, 96; sp. grav. 8.62) is a rare metal, which, in a state of purity, is of a silvery white color, has a strongly metallic lustre, is brittle, and very difficult of fusion. It never occurs native, and its principal ore is the bisulphide, which much resembles graphite. It is also occasionally found oxidised, in molybdate of lead. The metal may be obtained by roasting the bisulphide in a free current of air, when the sulphur goes off oxidised as sulphurous acid, and the M. is also oxidised into Molybdic Acid ( $\text{MoO}_3$ ), and remains in the vessel. By the action of charcoal, the reduced metal is then obtained from the acid.

M. forms three compounds with oxygen—the protoxide ( $\text{MoO}$ ), the blueoxide ( $\text{MoO}_2$ ), and molybdic acid ( $\text{MoO}_3$ ). Of these three, the last alone has any practical value. Molybdic acid is a white, glistening, crystalline powder, which is almost insoluble in water, fuses at a red heat, and unites with bases to form well-marked salts, the molybdates, which are either colorless or yellow. A solution of molybdate of ammonia is one of the most delicate tests for phosphoric acid.

M. forms various compounds with sulphur, chlorine, &c., none of which are of any practical importance, except the native bisulphide.

**MOMBA'SSA**, or Mombaz, a seaport town of East Africa, in the territory of the Sultan of Zanzibar, on a small coralline island off the coast, in the middle of an estuary formed by two small rivers, in lat.  $4^{\circ} 4'$  s., and long.  $39^{\circ} 43'$  e., about 150 miles north of Zanzibar Island. The shores of the island are rocky and abrupt; and although the channel may be forded at low water, the attempt is attended with danger. The town has the usual Arab characteristics of ruin, neglect, and filth in a striking degree. The only object of interest is an extensive fort, built on a rock, cut perpendicularly, in 1506, by the Portuguese, and restored by them in 1635, as an inscription over the principal gateway indicates. It is a work of considerable pretension, with upwards of one hundred guns in position, but in a ruinous condition. The inhabitants, the majority of whom are sunk in abject poverty, mostly live in wretched hovels, scattered among what remains of the once magnificent buildings. The town and island of M., as well as the surrounding district, is inhabited by the Wanika tribe. The harbor is still good, and is commodious and safe. M. was visited by Vasco da Gama in 1497, when he found it to be a large and very prosperous town. It was held by the Portuguese during the greater part of the period from 1522 to 1720, when it appears to have become independent. The English held it from 1824 to 1836, when they resigned it. Since then, it appears to have been possessed by the Sultan of Zanzibar, and apparently is considered a place of some importance. Burton says that the inhabitants of M. "are justly taxed with pride, bigotry, evil-speaking, insolence, turbulence, and treachery by other Arabs." Pop. 12,000 to 15,000.

**MOMENT**, of any physical agency, is its importance with reference to some special application. Thus, the moment of a force applied (perpendicularly) to a lever, is the importance of the force as regards turning the lever about its fulcrum. It is, as we know (see **LEVER**), proportional to the product of the force by the distance of its point of application from the fulcrum. The moment of a force about any axis (to which its direction is perpendicular) is the product of the force by its least distance from the axis; and a similar definition is laid down for moment of velocity and moment of momentum. It is easy to see (see **MOMENTUM**) that in any system

of mutually acting bodies the moment of momentum about any axis remains constant, since the equal mutual forces measure the momentum transferred from one body to another, and the moments of these forces are in pairs equal and opposite. A particular case of this is Kepler's law, that each planet describes equal areas in equal times about the sun.

**Moment of Inertia.**—In the rotation of bodies round an axis, the moment of inertia is the sum of the products of each particle of the body into the square of its distance from the axis; or if  $M$  be the body,  $m_1, m_2, m_3$ , &c., the particles composing it, and  $r_1, r_2, r_3$ , &c., their corresponding distances from the axis, then the moment of inertia of  $M = m_1 r_1^2 + m_2 r_2^2 + m_3 r_3^2 + \dots$ ; and if a quantity,  $k$ , be found such that  $Mk^2 = m_1 r_1^2 + m_2 r_2^2 + m_3 r_3^2 + \dots$ , then  $k$  is called the *radius of gyration*. See CENTRE OF GYRATION.

**MOMENTUM**, or Quantity of Motion, is defined by Newton as proportional to the mass moving, and its velocity, conjointly. If we assume unit of momentum to be that of unit of mass moving with unit of velocity, we shall evidently have, for the momentum of a mass  $M$ , moving with velocity  $V$ , the expression  $MV$ . And such is the unit generally adopted.

It is shown by experiment that, when force produces motion in any body, the momentum produced in one second is proportional to the force—and, in fact, *forces is measured by the momentum it is capable of producing in unit of time*. Thus, the same force, if acting for one second on each of a number of bodies, produces in them velocities which are *inversely* as their masses. Also when, as in the case of falling bodies, the velocities produced in one second are the same in all, we conclude that the forces are *proportional* to the masses; and, in fact, this is the physical proof that the weight of a body is proportional to its mass. Again, if different forces act, each for a second, on the same mass, the velocities produced are proportional to the forces. All these are but different modes of statement of the experimental fact, that force is proportional to the momentum it produces in unit of time; which forms a part of Newton's second Law of Motion.

When two masses act on each other, Newton's third Law of Motion (see MOTION, LAWS OF) shews that the forces they mutually exert are equal and opposite. The momenta produced by these must therefore be equal and opposite. Thus, in attraction or impact of two masses, *no momentum is lost*; since what is lost by one is gained by the other.

The momentum of a system of bodies can be resolved (as velocity is resolved) into components in any assigned directions, and the mutual forces of the system may be thus likewise resolved. Applying the previous result, we see at once that in any system of mutually acting bodies (such, for instance, as the solar system), no momentum is, on the whole, either gained or lost in any particular direction, it is merely transferred from one part of the system to another.

This fact, called the Conservation of Momentum, has caused great confusion in the minds of pseudo-physicists, who constantly confound it with Conservation of Work or Energy, a totally different thing.

The momentum produced by a force in any period of time is measured by the product of the force and the time during which it has acted—the energy or work done by a force is measured by the product of the force and the space through which it has acted. Momentum is proportional to the simple velocity of a body, and *can never, by any known process, be transformed into anything else*. Energy, when depending on velocity (see FORCE, CONSERVATION OF), is proportional to the square of the velocity, and is in the natural world constantly being transformed from its actual or kinetic form to its potential form, and back again, or to some other kinetic form such as heat, and finally must become heat. Momentum, on the contrary, is never altered, either in kind or in amount.

In knocking down a wall, or in staving in the whole side of a ship, the battering-ram of the ancients (when constructed of sufficient mass, and worked by the proper number of men or animals) was probably nearly as effective as the best modern artillery. But in making a breach in a wall, or in punching a hole in the armor of an iron-clad, mere massive shot with low velocities (such as those of the Dahlgren guns) are comparatively ineffective, however great their momentum; while an Armstrong or Whitworth projectile, with a fraction of the momentum, but with greater velocity, and, for its size, much greater kinetic energy, effects the object with ease.

In many every-day phenomena, we see most distinctly the difference between these two affections of matter. Thus, a blow delivered from the shoulder by a *heavy* pugilist, even if it be sluggishly given, generally floors its man, without doing much other injury; but a sharp stroke administered by a light weight, while hardly disturbing the adversary's equilibrium, inflicts serious punishment.

MOMMSEN, Theodor, a distinguished writer on the history and polity of ancient Rome, was born in 1817 at Gardlug, in Sleevig, where his father was a pastor in the Lutheran Church. M. studied first at Altona, and subsequently at the university of Kiel, where he graduated in arts in 1843. Having obtained some assistance from the Academy of Berlin to defray the expenses of a prolonged course of travels, M. spent three years in investigating Roman inscriptions in France and Italy, and from time to time published the result of his investigations in the *Annals of the Archaeological Institute of Rome* and the *Herculean Academy of Naples*. The political disturbances of 1848 diverted M. from his favorite pursuits; and for a time he devoted himself to politics, taking upon himself the editorship of the leading *Slesvig-Holstein paper*, for which he wrote the leading articles in the summer of 1848. M. held for a short time a chair in the university of Leipsic, but his appointment was cancelled on account of his strong political tendencies. He was made Titular Professor of Law at Zurich in 1852, and at Breslau in 1854; while, since 1858, he has filled the chair of Roman Law at Berlin. His attention has long been devoted to those branches of archaeology and ancient history with which his name is now so honorably associated. Among his most valuable contributions to these departments of knowledge, special mention must be made of the following: "*Die Universalhistorischen Dialekte*" (Leip. 1850), "*Corpus Inscriptionum Neapolitanarum*" (Leip. 1851); his monographs on "*The Chronography of the year*" 354, and "*Roman Coins*" (Leip. 1850); the edict of Diocletian, "*De Pretiis Rerum Venalium*" A. 301 (Leip. 1851); "*Inscriptiones Regni Neapolit.-Latinae*," 1852 "*Die Rechtsfrage zwischen Caesar und d. Senat*," 1857; his great work on Roman History, "*Röm. Geschichte*," 5th edition, 1868—1870 (ably translated into English by W. P. Dickson); "*Römische Forschungen*," articles on special points of Roman antiquities (1st vol., Berlin, 1864); "*Römisches Staatsrecht*" (1st vol., Leip. 1871); "*Die Erzählung von Cains Martius Coriolanus*;" and his "*Digesta Justiniani Augusti*" (Berlin, 1868—1870).

MOMORDICA, a genus of plants of the natural order *Cucurbitaceae*, having lateral tendrils, and the fruit splitting when ripe. *M. Balsamina*, a native of the south of Europe and of the East, produces a curious, oblong, much-warted fruit, called the *BALSAAM APPLE*, which, when green, is infused in oil, to form a vulnerary much esteemed in Syria and some other countries. The ripe fruit is a dangerous poison. The plant is used to form arbors.—The large, red, thorny fruit of *M. mizta*, called *Gol-takra* in India, is there used for food.—*M. echinata* is called the *Gooseberry Gourd*, because its fruit, which is covered with bristles, is about the size and shape of a large gooseberry. The unripe fruit is used for pickling, and is sometimes to be seen in Covent Garden market.

MOMPOX, a town of the United States of Colombia, on the Magdalena, 110 miles south-east of Cartagena. Here the Magdalena, during its periodical floods, rises 12 or 15 feet above its usual level; and the quay and custom-house of M. are built unusually high, in order to provide against this emergency. All the foreign goods destined for the consumption of the Valley of the Magdalena pass through this town. Pop. estimated at 10,000.

MONACHISM (Gr. *monachos*, a monk, from *monos*, alone) may in general be described as a state of religious retirement, more or less complete, accompanied by contemplation, and by various devotional, ascetical, and penitential practices. It is, in truth, ASCETICISM (q. v.), with the element of religious solitude superadded. The institution of monachism has, under different forms, entered into several religious systems, ancient and modern. That it was known among the Jews before the coming of our Lord, appears from the example of the prophet Elias, and from that of the Essenes; and it is probable that religious seclusion formed part of the practice of the NAZARITES (q. v.), at least in the later periods of Jewish history. In the Brahmanical religion, it has a promi-

ment place; and even to the present day, the *laseries* of T<sup>un</sup> may be said to rival in number and extent the monasteries of Italy or Spain. The Christian advocates of monachism find in the gospel exhortations to voluntary poverty (Matt. xix. 21) and to celibacy (1 Cor. vii. 37), at once the justification and the origin of the primitive institution. Its first form appears in the practice of asceticism, of which we find frequent mention in the early part of the 3d century. The primitive ascetics, however, lived among the brethren, and it is only in the following century that the peculiar characteristic of monachism begins to appear. The earliest form of Christian monachism is also the most complete—that already described under the head ANCHORITES (q. v.); and is commonly believed to have in part originated in the persecutions, from which Christians were forced to retire into deserts and solitary places. The anchorites maintained from choice, after the cessation of the persecutions, the seclusion to which they had originally resorted as an expedient of security; and a later development of the same principle is found in the still more remarkable psychological phenomenon of the celebrated PILLAR-SAINTS (q. v.). After a time, however, the necessities of the religious life itself—as the attendance at public worship, the participation of the sacraments, the desire for mutual instruction and edification—led to modifications of the degree and of the nature of the solitude. First came the simplest form of common life, which sought to combine the personal seclusion of individuals with the common exercise of all the public duties; an aggregation of separate cells into the same district, called by the name *Laura*, with a common church, in which all assembled for prayer and public worship. From the union of the common life with personal solitude is derived the name *cenobite* (Gr. *κοινος βίος*, common life), by which this class of monks is distinguished from the strict solitaries, as the anchorites or eremites, and in which is involved, in addition to the obligations of poverty and chastity, which were vowed by the anchorites, a third obligation of obedience to a superior, which, in conjunction with the two former, has ever since been held to constitute the essence of the religious or monastic life. The first origin of the strictly cenobitical or monastic life has been detailed under the name of ST ANTHONY (q. v.), who may be regarded as its founder in the East, either by himself or by his disciples. So rapid was its progress, that his first disciple, PACHOMIUS (q. v.), lived to find himself the superior of 7000. In the single district of Nitria, there were no fewer than 50 monasteries (Sozomen, "Eccles. History," vi. 81), and before long, the civil authorities judged it expedient to place restrictions on their excessive multiplication. It seems to be admitted, that, in the East, where asceticism has always been held in high estimation, the example of Christian monasticism had a powerful influence in forwarding the progress of Christianity; although it is also certain that the admiration which it excited occasionally led to its natural consequence among the members, by eliciting a spirit of pride and ostentation, and by provoking, sometimes to fanatical excesses of austerity, sometimes to hypocritical simulations of rigor. The abuses which arose, even in the early stages of monachism, are deplored by the very Fathers who are most eloquent in their praises of the institution itself. These abuses prevailed chiefly in a class of monks called *Sarabaites*, who lived in small communities of three or four, and sometimes led a wandering and irregular life. On the other hand, a most extraordinary picture is drawn by Theodoret, in his "Religious Histories," of the rigor and mortification practised in some of the greater monasteries. The monks were commonly zealots in religion; and much of the bitterness of the religious controversies of the East was due to that unrestrained zeal; and it may be added that the opinions which led to these controversies originated for the most part among the theologians of the cloisters. Most famous among these were an order called *Acemetae* (Gr. *σκηπτες*, sleepless), from their maintaining the public services of the church day and night without interruption. See MONOPHYTES, MONOTHEISM, NESTORIANS, IMAGE-WORSHIP.

It was in the cenobitic rather than the eremitic form that monachism was first introduced into the West, at Rome and in Northern Italy by Athanasius, in Africa by St Augustine, and afterwards in Gaul by St Martin of Tours. Here also the institute spread rapidly under the same general forms in which it is found in the Eastern Church; but considerable relaxations were gradually introduced, and it was not until the thorough reformation, and, as it may be called, religious revival effected by the celebrated ST BENEDICT (q. v.), in the beginning of the 6th c., that western monachism assumed its peculiar and permanent form. In some of the more isolated

churches, as, for instance, that of Britain, it would seem that the reformations of St Benedict were not introduced until a late period; and in that church, as well as in the church of Ireland, they were a subject of considerable controversy. One of the most important modifications of monachism in the West, regarded the nature of the occupation in which the monks were to be engaged during the times not directly devoted to prayer, meditation, or other spiritual exercises. In the East, manual labor formed the chief, if not the sole external occupation prescribed to the monks; it being held as a fundamental principle, that for each individual the main business of life was the sanctification of his own soul. In the West, besides the labor of the hands, mental occupation was also prescribed, not, it is true for all, but for those for whom it was especially calculated. From an early period, therefore, the monasteries of the West, and particularly those of Ireland, or of the colonies, founded by Irish monks, as Iona and Lindisfarne, became schools of learning, and training-houses for the clergy. At a later period, most monasteries possessed a *scriptorium*, or writing-room, in which the monks were employed in the transcription of MSS.; and although a great proportion of the work so done was, as might naturally be expected, in the department of sacred learning, yet it cannot be doubted that it is to the scholars of the cloister we owe the preservation of most of those among the master-pieces of classic literature which have reached our age.

In the remarkable religious movement which characterised the church of the 12th c. (see FRANCIS OF ASSISI, FRANCISCANS), the principle of monachism underwent a further modification. The *spiritual egotism*, so to speak, of the early monachism, which in some sense limited the work of the cloister to the sanctification of the individual, gave place to the more comprehensive range of spiritual duty, which, in the institute of the various bodies of FRIARS (q. v.) which that age produced, made the spiritual and even the temporal necessities of one's neighbor equally with, if not more than, one's own, the object of the work of the cloister. The progress of these various bodies, both in the 12th c. and since that age, is detailed under their several titles. It only remains to detail the later history of monachism, properly so called. The monastic institutes of the West are almost all offshoots or modifications of the BENEDICTINES (q. v.); of these, the most remarkable are the CARTUSIANS, CISTERCIANS, GRANDMONTINES, CLUGNIACS, PREMONSTRATENSIA, and above all MAURISTS, or Benedictines (q. v.) of St Maur. In more modern times, other institutes have been founded for the service of the sick, for the education of the poor, and other similar works of mercy, which are also classed under the denomination of monks. The most important of these are described under their several heads.

The enclosure within which a community of monks reside is called a MONASTERY (q. v.)—Gr. *monasterion*, Lat. *monasterium*. By the strict law of the church, called the law of cloister or enclosure, it is forbidden to all except members of the order to enter a monastery; and in almost all the orders, this prohibition is rigidly enforced as regards the admission of females to the monasteries of men. To such a length is this carried in the Greek Church, that in the celebrated enclosure of Mount Athos, not only women, but all animals of the female sex are rigorously excluded. The first condition of admission to a monastic order is the approval of the superior, after which the candidates remain for a short time as *postulants*. After this preliminary trial, they enter on what is called the *novitiate*, the length of which in different orders varies from one to three years; and at its close they are admitted to the profession, at which the solemn vows are taken. The age for profession has varied at different times and in different orders; the Council of Trent, however, has fixed 16 as the minimum age. Originally, all monks were laymen; but after a time, the superiors, and by degrees other more meritorious members, were admitted to holy orders. The distinction of priest-monks and lay-brothers has been already explained under the head FRIAR; but in both alike, where the order is one of those solemnly approved by the church, the engagement taken at the final profession is life-long and irrevocable.

The monastic institute, from the very earliest time, embraced women as well as men. The former were called in Greek by the name *nonis* or *nonna*, and in Latin *nenna* (from which the English *nun*), as also *sanctimonialis*. The cloistered residence of nuns is called by various names, as NUNNERY, CONVENT, a name also applied to the houses of men. The general characteristics of the monastic institute for females are substantially identical with those of the male orders; and as the princi-



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pal varieties of institute are detailed under their respective heads, it is needless to particularise them here.

It is hardly necessary to say that the reformed churches in the 16th c. discarded the practice of monachism, and suppressed the monastic houses. In some of the German states, the temporalities of the suppressed monasteries were retained, and were granted at pleasure by the sovereign, to be enjoyed together with the titular dignity. Some of the German churches, however, in later times, have revived the institute both for men and for women, as has also been done in the Anglican Church both in the time of Laud and in our own day. In all these Protestant revivals of monachism, however, the engagement is revocable at the will of the individual. At the French Revolution, the monastic establishments of France were utterly suppressed; and in most of the other Catholic countries of Europe, the example has been followed to a greater or less extent. In England and Ireland and America, on the contrary, the institute has made rapid progress within the last 20 years. Most of the orders, however, introduced into these countries are of the active rather than of the contemplative class.

**MONACO**, a small principality of Italy, on the coast of the Mediterranean Sea, a few miles north-east of the city of Nice. The climate is fine, so that oranges, lemons, &c. are produced in abundance. Population (1873) 5741. From the 10th to the 18th c., M. was held by the Genoese family of Grimaldi. In 1515, it was ceded to Sardinia, which, however, recognised its independence, but reserved to itself the right of garrisoning the town of Monaco. At this period, it consisted of three communes—Monaco, Mentone, and Rocca-bruna, with an area of 52 square miles, and a population of about 7000. In 1848, Mentone and Rocca-bruna were annexed to Sardinia, in spite of a protest by his "Serene Highness," Carlo Honorio, third prince of Monaco. The Italian war of 1859 placed the whole territory for a brief period under Victor Emmanuel; but Carlo Honorio having sold Mentone and Rocca-bruna (21 Feb. 1861) to the French emperor for 4,000,000 francs, Sardinia was obliged to renounce her hold upon them. The sovereign prince of M. now possesses nothing but the city and a small patch of territory, with a total area of 6 sq. m.; pop. (1873) 5741. The town is a beautiful place on a rocky promontory, with 2667 inhabitants.

**MONAD** (Gr. *monas*, unity), a term borrowed from the Peripatetic philosophy, although employed by moderns in a sense different from that of the Peripatetics, who used it to designate the universe, understood in the pantheistic sense. By moderns, and especially by LEIBNITZ (q. v.), from whose system alone the name has derived importance, it is used to describe the primary elements of all matter. The monads are simple uncompound substances, without figure, without extension, without divisibility, by the aggregation of which all bodies are formed, and into which all compounded things may ultimately be resolved. The monads are created things, but as being uncompound, are indestructible; and although subject to change, the change is but external or relative. They are of two classes—the first are destitute of consciousness, although possessing an internal activity which is called by the name of perception; the second possess, in addition to perception, a certain consciousness, which is called by the name of "apperception" or conscious-perception. The monads of this class are souls, and according to the degree of their consciousness is the distinction between the souls of the higher and those of the lower intelligences. The Deity is the PRIME MONAD, or MONAD OF MONADS. The theory of monads enters largely into the philosophic system of Leibnitz, and indeed furnishes the key to much in that system which is otherwise obscure.

**MONAD** (*monas*), the generic name of many kinds of microscopic organisms, very minute, and supposed also to be of very simple organisation. They appear, even under a powerful microscope, as mere points, moving rapidly through the fluid in which they exist, and often becoming aggregated in clusters; or they are seen to be gelatinous and globular, or nearly so, with a tail or thong-like filament, by the vibrations of which they move. When the fluid is tinted by means of some harmless coloring matter, the existence of several cells or vesicles is discerned within the minute body. Ehrenberg therefore classed them among Polygastric Infusoria (see INFUSORIA), and no naturalist doubted their right to a place, although one of the lowest, in the animal kingdom. They are now universally regarded as vegetable,

and are ranked among algae. The organisms formerly known as *Globe Animalcules* (*Volvox*) are clusters of monads produced by gemination from one, and invested with a common envelope. Monads are of various colors. Their gemination takes place according to fixed laws, so that the groups assume particular forms, characteristic of the different kinds. Thus, in the "Breast-plate Animalcule" (*Gonium pectorale*), so called from the form which the group frequently presents, a division takes place into four, and the number in a group is always either four or sixteen, a group of sixteen always dividing into four parts, each of which contains four monads.—The minute moving points often seen under the microscope are probably often not monads, but spores or germs.

**MONA'DNOCK**, Grand, a mountain in the south-west corner of New Hampshire, United States of America, which from a base of 5 by 3 miles, rises to a height of 3450 feet. It is composed of talc, mica, and slate, can be seen from the State House at Boston, and is a landmark at sea. Thirty lakes, some containing numerous islands, can be seen from its summit.

**MONAGHAN**, an inland county of the province of Ulster, Ireland, situated between Tyrone on the n., Armagh and Louth on the e., Meath and Cavan on the s., and Fermanagh on the w. Its greatest length from north to south is 37 miles; its greatest breadth, east and west, is 23; the total area being 500 square miles, or 319,751 acres, of which 285,866 are arable. The population, which in 1861 was 126,340, had fallen in 1871 to 114,970. The general surface is undulatory, the hills, except in the north-west and east, being of small elevation, although often abrupt; the highest point does not exceed 1254 feet above the sea. It is interspersed with lakes of small extent, and for the most part of little depth, and although the streams are numerous, there is no navigable river within its boundaries. In its geological structure, the level country belongs to the great central limestone district; the rest is of the same transition formation which is met with in the northern tract of Leinster. No minerals are found in a remunerative quantity; there is a small coal-field in the southern border, but it has not been found profitable to work. The soil is very varied in its character, and for the most part is wet and imperfectly drained, although commonly capable of much improvement; but in general it is found suitable for the production of cereal crops (with the exception of wheat, which is little cultivated), and of flax. The total area under crops in 1876 was 139,739 acres. There were 60,569 acres under oats, and 12,304 acres under flax. The cattle in the same year numbered 85,569; sheep, 15,999; pigs, 32,056. The annual valuation of property in 1874 was £262,432. M. is well supplied with good roads, and is connected by railway with Dublin, Belfast, and Galway, and directly with the coast at Dundalk. The Ulster Canal passes through the county. The principal towns of this county are Monaghan (q. v.), Carrickmacross, Clones, and Castle-Blaney. It returns two members to parliament, the constituency being, at the enumeration of 1873, 5608. M., at the invasion, formed part of the grant of Henry II. to De Courcay, and was partially occupied by him; but it speedily fell back into the hands of the native chiefs of the sept MacMahon, by whom (with some alternations of re-conquest) it was held 'till the reign of Elizabeth, when it was erected into a shire. Even still, however, the authority of the English was in many places little more than nominal, especially in the north; and in the rising of 1641, the MacMahons again resumed the territorial sovereignty. The historical antiquities of the county are of little interest or importance. It possesses two round towers, one very complete, at Clones, the other at Inniskeen; and there are many remains of the ancient earthworks commonly referred to the ante-English period. The total number of children attending the superior and primary schools in the county of M. during 1871 was 12,749, of whom 8586 were Roman Catholics.

**MONAGHAN**, chief town of the county of the same name, is situated on the great north line from Dublin to Londonderry, distant from the former 76 miles north-north-west. Pop. in 1871, 8632. M., before the Union, was a town of some importance, having a charter from James I., and returning two members to the Irish parliament. It is still the centre of an active inland trade, and can boast some public buildings of considerable pretensions, among which are the jail, market-house, and court-house. A Roman Catholic college and a cathedral dedicated to St Mic

Carthain, also deserve special notice. The general market is on Monday; 8 markets for agricultural produce are held weekly, and there is also a monthly fair.

**MONARCHY** (Gr. *monarchia*, from *monos*, alone, and *archō*, to govern; literally, the government of a single individual) is that form of government in a community by which one person exercises the sovereign authority. It is only when the king, or chief magistrate of the community, possesses the entire ruling power, that he is in the proper acceptance of the term a monarch. Most of the oriental governments past and present, Russia at present, and Spain and France as they were in the last century, are in this strict sense monarchies. The degenerate form of monarchy is tyranny, or government for the exclusive benefit of the ruler. When the head of the state, still possessing the status and dignity of royalty, shares the supreme power with a class of nobles, with a popular body, or with both, as in our own country, the government, though no longer in strictness monarchical, is called in popular language a mixed or limited monarchy, the term absolute monarchy being applied to a government properly monarchical. The highest ideal of government would perhaps be attained by an absolute monarchy, if there were any security for always possessing a thoroughly wise and good monarch; but this condition is obviously unattainable, and a bad despot has it in his power to inflict infinite evil. It therefore becomes desirable that a governing class, composed, if possible, of the wisest and most enlightened in the country, should share the supreme power with the sovereign. A limited monarchy has this advantage over an aristocratic republic, that in difficult crises of the nation's existence, royalty becomes a neutral and guiding power, raised above the accidents and struggles of political life.

Monarchy, most usually hereditary, has sometimes been elective, a condition generally attended with feuds and distractions, as was the case in Poland. The elective system is still followed in the choice of the pope. Constitutional monarchy may be in its origin elective, or combine both systems, as when one family is disinherited, and the sceptre declared hereditary in the hands of another under certain conditions. See **KING**, **REPUBLIC**.

**MONASTERY** has been described under the head of **MONACHISM** (q. v.) as the generic name of the residence of any body of men, or even, though more rarely, of women, bound by monastic vows. It may be useful, however, to detail the various classes of monastic establishments of the Western Church, and to point out the leading characteristics of each. The name, in its most strict acceptance, is confined to the residences of monks, properly so called, or of nuns of the cognate orders (as the Benedictine), and as such, it comprises two great classes, the *Abbey* and the *Priory*. The former name was given only to establishments of the highest rank, governed by an abbot, who was commonly assisted by a prior, sub-prior, and other minor functionaries. An abbey always included a church, and the English word *Minster*, although like the cognate German *Münster* it has now lost its specific application, has its origin in the Latin *monasterium*. A *Priory* supposed a less extensive and less numerous community. It was governed by a Prior, and was originally, although by no means uniformly, at least in later times, subject to the jurisdiction of an abbey. Many priories possessed extensive territorial domains, and of these, not a few became entirely independent. The distinction of abbey and priory is found equally among the Benedictine nuns. In the military orders, the name of *Commandery* and *Preceptory* corresponded with those of abbey and priory in the monastic order. The establishments of the Mendicant, and, in general, of the modern orders, are sometimes, though less properly, called monasteries. Their more characteristic appellation is *Priory* or *Convent*, and they are commonly distinguished into *Professed Houses* (called also *Residences*), *Novitiates*, and *Colleges*, or *Scholastic Houses*. The names of the superiors of such houses differ in the different orders. The common name is *Rector*, but in some orders the superior is called *Guardian* (as in the Franciscan), or *Master*, *Major*, *Father Superior*, &c. The houses of females—except in the Benedictine or Cistercian orders—are called indifferently *Convent* and *Nunnery*, the head of which is styled *Mother Superior* or *Reverend Mother*. The name *Cloister* properly means the enclosure; but it is popularly used to designate, sometimes the arcaded ambulatory which runs around the inner court of the building, sometimes, in the more general sense of the entire building, when it may be considered as synonymous with *Convent*.

**MONASTIR** (Toli-Monastir, or Bitolla), a town of European Turkey, capital of the vilayet named after it, is situated in a broad valley of the Nijl Mountains, 90 miles north-north-east of Janina, and about the same distance west-north-west of Saloniki. It is an important place, is the residence of the governor-general, and commands the routes between Macedonia and Northern Albania. The inhabitants are mostly Greeks and Bulgarians. M. has 11 mosques, and carries on a large trade with Constantinople, Saloniki, Vienna, and Trieste. From Constantinople alone it annually buys goods to the value of £1,500,000. Its bazaars, containing more than 2300 shops, are well stocked with the products of Western Europe and the colonies, as also with native manufactures. Yet it is one of the worst built and most tasteless towns in all Turkey. Pop. 34,000.

**MONASTIR**, a seaport town of North Africa, in the dominion of Tunis, 80 miles south-south-east of the city of that name, on the Gulf of Sidra. Woollen and camellet fabrics are manufactured, and there is some maritime trade. Pop. 12,000.

**MONBODDO**, James Burnet, Lord, a Scottish lawyer and author, was born at Monboddoo, in Kincardineshire, in 1714, educated at Marischal College, Aberdeen, where he displayed a great fondness for the Greek philosophers, and afterwards studied law for three years at Groningen, in Holland. In 1737, he became a member of the Scottish bar, and soon obtained considerable practice; but the first thing that brought him prominently into notice was his connection with the celebrated Douglas case, in which Mr Burnet acted as counsel for Mr Douglas. In 1767, he was raised to the bench by the title of Lord Monboddoo. He died 26th May 1799. M.'s first work, on the "Origin and Progress of Language" (1771—1776), is a very learned, heretical, and eccentric production; yet in the midst of its grotesque crotchets there occasionally flashes out a wonderfully acute observation, that makes one regret the distorted and misapplied talent of the author. The notion that men have sprung from monkeys, is perhaps that which is most commonly associated with the name of M., who gravely asserted that the orang-outangs are members of the human species, and that in the Bay of Bengal there exists a nation of human creatures with tails, and that we have only worn away ours by sitting on them, but that the stumps may still be felt. M. wrote another work, entitled "Ancient Metaphysics," which was published only a few weeks before his death.

**MONCADA**, Don Francisco de, Conde de Osoua, an historian, and one of the Spanish classics, born 29th December 1586, at Valencia, where his grandfather was then viceroy. Descended from one of the greatest families of Catalonia, he rapidly rose to the highest offices in the state, was ambassador to Vienna, and latterly governor of the Netherlands, and commander-in-chief of the Spanish troops there. He distinguished himself both as a statesman and a soldier. He fell at the siege of Goch, a fortress in the duchy of Cleves, in 1635. His "Historia de la Expedicion de Catalones y Aragoneses contra Turcos y Griegos" (Barcelona, 1623, and frequently reprinted), is a master-piece in liveliness and elegance of style.

**MONCALIERI**, a town of Italy in the province of Turin, situated finely on the slope of a hill, on the right bank of the Po, five miles above Turin. Pop. 3030. M. is the first railway station between Turin and Genoa, and communicates daily with Turin by frequent omnibuses; it has fine buildings, including a palace lately embellished for the residence of King Victor Emmanuel. The annual cattle-fair held in October, at M., is the most important of the north of Italy.

**MONDOVI**, an episcopal town in Cuneo, one of the northern provinces of Italy, situated on the summit and shoulder of an Alpine hill, 50 miles south of Turin. It is divided into four sections: the Piazza—encircled by walls, and containing the chief buildings of the place, and the suburbs, Carassone, Breo, and Piano del Valle. In the neighborhood, considerable activity exists in cloth, silk, and bonnet-straw manufactures; but in spite of vineyards and chestnut woods, the numerous remains of ruined buildings in its vicinity impart an air of desolation to the locality. The Piazza contains a fine cathedral, with rich paintings; an episcopal palace with a noble gallery of portraits; and the various judicial and educational halls. Pop. 1230. At the battle of M., on the 22d April 1796, the Sardians were totally defeated by Bonaparte, and the entrance into Piedmont secured to the French army. The province of M. is intersected by spurs of the Alps, and contains rich marble quarries and valuable mineral products.

**MONE'SIA BARK**, the bark of a tree (*Chrysophyllum glycyphllum*, or *C. Duranheim*), of the same genus with the Star Apple (q. v.), a native of the South of Brazil. The bark is lactescent; but when dried, it is thick, flat, compact, heavy, brown, and hard, with a taste at first sweet, afterwards astringent and bitter. A substance called *Monesia* is extracted from it, which is almost black, at first sweet, then astringent, and finally acrid. It is used as a stomachic and alterative in leucorrhœa, chronic diarrhœa &c. It contains, in small quantity, a principle called *Monesin*.

**MONEY**, in Political Economy. This is a word in continual use all over the civilised world, and perhaps there is none the meaning of which in connection with the business they have in hand is more distinctly understood by those who use it; and yet, on the other hand, there is none of which it is more difficult to give a comprehensive account or a strict definition. Presuming, then, that every one knows the practical use of the word in the affairs of common life, the best thing to be done here will be to point out a few distinctions which may tend to obviate confusion in the comprehensive use of the term as an element in economic science.

Money is often spoken of loosely as the same thing with capital; but they are different. Before anything is money, it must be such that you can go into the market and immediately use it in purchasing commodities or paying debts. The plant of a railway and the machinery of a mill, so long as they are in full use, are capital, and are capital which probably has once been money—but they are money no longer, because you cannot use them in making payments, though they have perhaps become more valuable than ever they were. The confusion of capital with money was the mistake made in issuing the French assignats on the security of the forfeited landed estates. Each assignat was a promise to pay; but when payment was demanded, it could not be made, because land was not a medium for making it. It is of the essence of money, then, that it is capable of making immediate payment either to satisfy a seller or a creditor. But an article may be money though it will not satisfy everybody; and articles available as money—even those most universally accepted as such—are available for other purposes. What we are familiar with as the most approved form of money—as the thing that will be most certainly received in payment all over the world—is coin of the precious metals. The reason why the claim of these is so universally accepted is, that they do not merely *represent* value, as we shall find other kinds of money do, but they really are value. If the dealer sells a hat for a sovereign, he knows that the sovereign does not depend, like a pound-note, on the solvency of the issuer, but that it has got value put into it by costing about as much labor and skill in bringing it into existence as the hat he gives for it. But even all coins perfectly available for value are not of the intrinsic value of their denomination. The silver for making 20 shillings is a good deal less valuable as a commodity than the gold in a sovereign, and in the same way, 240 pence, which are as money equal to a sovereign; only make a percentage of it in value as merchandise. The convenience of their use for small transactions makes up for depreciation in value of coins of the inferior metals, when gold is a standard; and to prevent incidental abuses, the law limits the extent to which they are a legal tender as good money.

Money transactions are distinguished from barter, in which one commodity is transferred for another, as when the shepherd, in primitive times, may be supposed to have given the agriculturist a sheep for a measure of corn. This distinction is extremely useful, since the invention of a circulating medium, which supersedes the narrow, cumbrous process of barter, by facilitating transactions of every variety of importance among all sorts of people, is a grand type of advance in civilisation. Like many other distinctions, however, it has not an absolute line of demarcation. The precious metals hold their value by their being commodities as well as being money, and coins are frequently used up for plate and jewellery. Where money is only available within one narrow region, its use verges on barter. In Central Africa purchases are made and debts paid by strings of beads or coils of brass wire. An ivory merchant or a traveller will lay in a stock of these, just as in Europe he would carry gold or circular notes. They are commodities, being used as ornaments by the inhabitants. But they are distributed to an extent far beyond the demand in this shape, and that they absolutely constitute money is shewn by this peculiarity in the case of beads, that a particular color will pass current, and another will not; so that the merchant who chooses the wrong kind,

though he have full value in merchandise, has not taken with him a supply of available cash.

Under the head of **BULLION**, it is shewn how the precious metals are an expensive form of money, which there is a temptation to supersede by paper-money. For the various opinions adopted by different classes of economists on paper-money, and the devices for getting over the great difficulty of rendering this kind of money secure, and equal in value to bullion, reference is made to the article **CURRENCY**. It may here be proper to state, that paper-money, or money founded on credit—one of the resources of advanced civilisation and complicated commerce—introduces a class of moneys so extensive and various, that it is impossible to mark the limits of its extent, or enumerate the shapes it may take. An attempt has been made to get rid of all difficulties by saying that a promise to pay is only the representative of money. But if it serve the purpose of buying or paying debt, it really is money. No one hesitates in counting a £5 Bank of England note as money. But a cheque by a person known to have a balance or credit at a solvent bank, is equally money; and though it is an order to pay, no actual bullion need ever be given for it, for the payment may be in notes, or the holder may hand it over to his own banker, in whose accounts it will be credited to the holder, and debited against the banker on whom it is drawn. The special difficulty as to paper-money is, that it may be mistaken for money when it is none, as in the case of a cheque not honored by payment; or, that it may be of less intrinsic value than it professes to be, as when there is what is called an over-issue (see **CURRENCY**). There are thus great risks attached to the use of paper-money; but there are also risks specially applicable to bullion-money, as light weight, base coin, and the absence of those facilities for detection in theft or fraud, which are among the advantages of paper-money. The special risks attending the use of paper have been shewn in practice to be so capable of remedy by legislative precautions, that at present, in Scotland, one-pound notes are taken with less suspicion than sovereigns. On transactions in general, the chance of loss from forgery or insolvency is deemed less than the chances from light weight, even if the risk of base coinage should not come into consideration.

Making allowance for coins sent abroad or used as metal, the money of Britain is calculated at: gold, seventy-five millions; silver and copper, thirteen millions; and notes, forty-two millions—in all, one hundred and thirty millions. But so large is the extent of paper-money, in the shape of drafts and bills, that of these payments, to the extent of more than two thousand millions in a year are settled at the London clearing-houses, or the establishments where the London banks, and those dealing with them, clear off their mutual obligations by paying over the balances.

**MONGE**, Gaspard, Comte de Péluse, a French mathematician and physicist, was born of humble parentage at Beaune, in the department of Côte d'Or, 10th May, 1746. When only fifteen, he went to study natural philosophy at the Oratorian College of Lyon, and afterwards obtained admission into the famous artillery school at Mézières, where he invented the method known as "Descriptive Geometry," which was at first received with incredulity, but afterwards with avidity, and, for a time, jealously kept secret by the military authorities. In 1772 M. became tutor and professor at Mézières; in 1780, he was chosen a member of the French Academy, and in the same year, was called to Paris as Professor of Hydrodynamics at the Louvre. As a lecturer, he was precise, clear, and brief; his style was a model of scientific rigor, if not of literary elegance. During the heat of the Revolution, he became Minister of Marine, but after a few months resigned the office. He did not, however, retire into obscurity, but took charge of the great manufactories improvised for supplying the million of soldiers whom republican France had launched against her enemies, with arms and gunpowder. At this critical period, he shewed himself possessed of a genius equal to the occasion. He was everywhere, animating, ordering, counselling, and directing the patriotic artisans. Yet it is characteristic of the insane fanaticism that, for a time, got the upper hand in France, that M. himself only escaped the guillotine on account of his services being absolutely indispensable. After he had founded the *Ecole Polytechnique*, he was sent by the Directory to Italy, and intrusted with the transport of the artistic spoils of the republican armies. Here he formed a close friendship with Bonaparte, whom he followed to Egypt. He now undertook the management of the Egyptian Institute. During the expedition to Syria, he performed the greatest services to the government estab-

lished at Alexandria. On his return to France, he resumed his functions as Professor in the Ecole Polytechnique, and, though his reverence for Napoleon continued unabated, he hotly opposed his aristocratic and dynastic views. The title of Comte de Péluze (Pelusium) was conferred on him by Napoleon, in memory of the Egyptian expedition. He died 28th July 1818. M.'s principal works are: "Traité Élémentaire de Statique" (7th edit. Paris, 1834); "Leçons de Géométrie Descriptive" (6th edit. Paris, 1837); and "Application de l'Analyse à la Géométrie des Surfaces du 1 et du 2 Degré" (4th edit. Paris, 1809). See Dupin's "Essai Historique sur les Services et les Travaux Scientifiques de Monge" (Paris, 1819).

**MONGHYR**, a city of India, capital of a district of the same name, is situated on the right bank of the Ganges, 30 miles west-north-west of Bhagulpur. It is a large and thriving town, and carries on extensive manufactures of hardware and firearms, which, however, are of very inferior quality. Owing to the salubrity of its climate, it is a favorite residence of invalided military men and their families. Pop. (1872) 59,698. The district has an area of 3918 square miles, with a pop. of 1,812,934. M. is on the line of the East Indian Railway.

**MO'NGOLS**, the name of a numerous and widely spread branch of the human family—the second in the classification of Blumenbach, and corresponding in almost every respect with the branch designated as Turanian by more recent ethnologists. See **TURANIANS**. Under the designation of M. are included not only the Mongols Proper, but the Chinese and Indo-Chinese, Tibetans, Tartars of all kinds, Burmese, Siamese, Japanese, Esquimaux, Samoeds, Finns, Lapps, Turks, and even Magyars. Collectively, they are the great nomadic people of the earth, as distinguished from the Aryans, Semites, and Hamites; and are the same who, in remote antiquity, founded what is called the "Median Empire" in Lower Chaldaea, an empire, according to Rawlinson, that flourished and fell between about 2453 and 2234 B.C.; that is, before Nineveh became known as a great city. Thus early did some of these nomadic tribes, forsaking their original pastoral habits, assume the character of a nation. Another great offshoot from this stock founded an empire in China, the earliest date of which it is impossible to trace, but which certainly had reached a state of high civilisation at least 2000 years B.C. In early Greek history, they figure as Scythians, and in late Roman, as Huns, carrying terror and desolation over the civilised world. In the middle ages, they appear as Mongols, Tartars, and Turks. In the beginning of the 13th c., Genghis-Khan (q. v.), originally the chief of a small Mongol horde, conquered almost the whole of central and eastern Asia. His sons and grandsons were equally successful, and in 1240–1241, the Mongol empire extended from the sea-board of China to the frontiers of Germany and Poland, including Russia and Hungary, and the whole of Asia, with the exception of Asia Minor, Arabia, India, and the Indo-Chinese states, and northern Siberia. This vast empire soon broke up into a number of independent kingdoms, from one of which, Turkestan, arose another tide of Mongol invasion under the guidance of Timur or Tamerlane, who, in the latter part of the 14th c., reduced Turkestan, Persia, Hindustan, Asia Minor, and Georgia, under his sway, and broke, for a time, the Turkish power. On the death of his son Shah Rokh, the Mongol empire was subdivided, and finally absorbed by the Persians and Usbeks, but an offshoot of Timur's family founded, in the 16th c., the great Mogul empire of Delhi. After the decline of Timur's empire, the Turkish branch maintained the glory of the race, and spread terror to the very heart of Western Europe. In the 9th c., the Magyars, a tribe of Ugrians, also of Mongol extraction, under their leader Arpad, established themselves in Hungary, where, in process of time, they became converted to Christianity, and founded a kingdom famous in European history. See **TURKS** and **HUNGARY**.

The physical characteristics of the M. in their primitive state are thus described by Dr Latham in his "Descriptive Ethnology": "The face of the Mongolian is broad and flat. This is because the cheek-bones stand out laterally, and the nasal bones are depressed. The cheek-bones stand out *laterally*. They are not merely projecting, for this they might be without giving much breadth to the face, inasmuch as they might stand forward. . . . The distance between the eyes is great, the eyes themselves being oblique, and their caruncule being concealed. The eyebrows form a low and imperfect arch, black and scanty. The iris is dark, the cornea yellow. The complexion is tawny, the stature low. The ears are large, stand-

ing out from the head; the lips thick and fleshy rather than thin, the teeth somewhat oblique in their insertion, the forehead low and flat, and the hair lank and thin." Of course, such a description as this cannot be understood as applying to the more civilised nations of Mongol origin, such as the Turks and Magyars, especially the latter, who, in physical appearance, differ but little, if at all, from other European nations.

In religion, the M. are, for the most part, Buddhists. There are among them, however, according to the different countries in which they reside, various other religions, as Confucianism, Taoism, fire-worship, paganism of different kinds, Mohammedanism, and Christianity. The Mongol languages, which are very numerous, are described by Dr Latham as being "aptotic and agglutinate, rarely with true amalgamate inflection." In 1859, according to an estimate formed by Professor Dieterici, the M. of all kinds amounted in number to as many as 528,000,000, or about half of the human race.

**MONIMIA'CEÆ**, a natural order of exogenous plants, consisting of trees and shrubs, with opposite leaves destitute of stipules; the bark and leaves having an aromatic fragrance. The flowers are unisexual. The perianth is somewhat globose, divided at the border sometimes into more rows than one. The stamens are numerous, and arise from and cover the whole interior of the tube of the perianth. There are several ovaries, each with one ovule. The fruit consists of several achænia, enclosed within the enlarged calyx. There are about 40 known species, natives chiefly of South America. A few are found in New Zealand and Australia. The fruit of the **BOLDU** (*Boldoa fragrans*), a shrub or small tree, a native of Chili, is eaten. It is a little drupe, about the size of a currant, extremely fragrant when dried.

**MONITEUR**, Le, a celebrated French journal, started by the publisher, Charles Joseph Panckoucke, 5th May 1789, under the title of the "Gazette Nationale, ou le Moniteur Universel." After the crisis of the 10th August 1792, its importance as a daily register of the events which occurred during the dark days of the Revolution, immensely increased. Whoever wishes to obtain a complete view of the phenomena of the Reign of Terror, should consult Thuan-Grandville's "Gazette Nationale, ou le Moniteur Universel, commence le 5th Mai 1789, précédé d'une Introduction historique contenant un Abrégé des anciens Etats-généraux, des Assemblées des Notables, et des principaux Evénement qui ont amené la Révolution" (1796). In 1800 it altered its form so far as to divide itself into two halves, of which the first contained the "Actes du Gouvernement." This change imparted to the journal something of an official character. After January 1, 1811, it dropped the title of "Gazette Nationale," retaining only that of "Moniteur Universel." After the Restoration it became the government organ, which it continued to be until 1869, when its official connection was discontinued.

**MONITOR**, a name given to many species of saurian reptiles, nearly allied to the true lizards, from which they differ in having no teeth on the palate. Among them are some of large size, the largest of existing saurians except those of the crocodile tribe. The tail of the greater number is laterally compressed, the better to adapt them to aquatic habits. They receive the name M. from a notion that they give warning by a hissing sound of the approach of a crocodile or alligator. For the same reason, some of the American species receive the French name *Sauvegarde*. Those of the Old World form the family *Monitoriæ*, and those of America the family *Tritonæ* of some naturalists. There are several genera of both.—The M. or **VARAN** or **THE NIL** (*M. Niloticus*) is of a rather slender form, and has a long tail. It is olive gray, mottled with black. It attains a length of five or six feet. Crocodiles' eggs form part of its food. The **TIGUEXIN** (*Telus Teguezin*) of Brazil and Gulara is of similar size. It preys on aquatic animals. Other large species are plentiful in almost all tropical countries. They are powerful animals, have strong teeth, and defend themselves vigorously if attacked. Some comparatively small species, feeding chiefly on insects, are found in dry situations. Some of the large South American species are used for food.

**MONITOR**. See **TURRET-SHIP**.

**MONITORIAL SYSTEM**, or Mutual Instruction. It first occurred to Dr Bell (q. v.), when superintendent of the Orphan Hospital, Madras, in 1795, to make use of



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the more advanced boys in the school to instruct the younger pupils. These youthful teachers were called Monitors. The method was eagerly adopted by Joseph Lancaster (q. v.) who, in the first years of this century, did so much for the extension of popular education; and from him and the originator, the system was called indifferently the Madras and the Lancastrian, as well as the Monitorial or Mutual System. The monitorial system is not, as is commonly supposed, a method of teaching; it is simply a method of organising schools, and of providing the necessary teaching power. At a time when the whole question of primary education was in its infancy, the state refusing to promote it on the ground that it was dangerous to society, and the public little disposed to contribute towards its extension, it was of great importance that a system should be adopted which should recommend itself as at once effectual and economical. It was manifest that even with the most skilful arrangement of classes, a single teacher could not undertake the tuition of more than 80 or 90 pupils; while, by the judicious employment of the cleverer boys under the general direction of the master, the school might be made almost self-working, and 300 to 400 children taught where there was only one adult superintendent. The novelty and economy of this plan, and we may add also, its temporary success, gained for it a large and enthusiastic support both in Britain and in Germany. But the importance of the system as an educational agency was universally over-rated, for although it is to be admitted that, under an able and enthusiastic master, boys may be inspired to teach well all technical and rote subjects, (as, for example, in the Latin and Greek classes under Dr Pillans of the Edinburgh High School), yet it is manifest that children so instructed are not in any sense of the word educated. Their monitor necessarily lacks the maturity of mind which is indispensable to the instructor, whose business it is to arouse in the child those mental operations which have taken place within himself, and so lead him to an intelligent and rational grasp of intellectual and moral and physical truths. No amount of private instruction from the master, no enthusiasm could ever enable a boy to do this, and consequently the system broke down, after having done its work by being the engine whereby a large interest was stirred up in the education of the masses, and whereby the requisites of a primary teacher were brought into view. The reaction against the system, however, was not so violent in Great Britain or in Holland and France, as in Germany. In England, the monitorial system was modified in such a way as to secure for the master the aid of the more clever boys in teaching rote subjects, in revising lessons, keeping registers, and supervising the work of those classes not directly under the master's tuition. In this way were afforded the means of training for the teaching profession boys who seemed fitted by natural endowment for the work. Hence the prevalent employment in this country of paid monitors and pupil-teachers (male and female), who are regularly apprenticed to school managers and teachers, and go forward to be trained in the normal schools now so numerous.

**MONK, George, Duke of Albemarle**, was the son of Sir Thomas Monk of Potlridge, in Devonshire, and was born at his father's residence, 6th December 1603. He spent some of his earlier years in the service of Holland, returned to England when about the age of 30, and served in the king's army against the Scots in 1633, attaining the rank of lieutenant-colonel. On the breaking out of the Irish rebellion, in 1642, he was appointed colonel of Lord Leicester's troops, sent to crush it. When the civil war began, these troops were recalled, and M. was imprisoned on account of being supposed to favor the cause of the Parliament, but was soon after released. In 1644, he was defeated and taken prisoner by Fairfax, and imprisoned in the Tower, from which he was liberated, after two years, on his swearing the Covenant. Clarendon hints that he sold himself for money. He was now intrusted with the command in the north of Ireland. Cromwell had a high opinion of his military talents, and made him his lieutenant-general and commandant of artillery; and the service which he rendered at the battle of Dúnbar was so great, that he was intrusted with the chief command in Scotland. In 1653, he was joined with Admiral Blake in an expedition against the Dutch, and with his division of the fleet, consisting of 100 ships, defeated Admiral Van Tromp off Nieuwpoort, and fought another battle with him off Katwijk, in which the victory was doubtful, but Van Tromp lost his life. In April 1654, Cromwell sent him to Scotland as governor, in which difficult office he conducted himself with vigor, moderation, and equity. Even the high-

lands, those immemorial "sanctuaries of plunder," as Guizot calls them, were reduced to order. His principal residence was Dulkeith, where he spent his leisure hours in gardening, of which he was very fond. When, after Cromwell's death, he saw everything in confusion, and felt his own position perilous, he crossed the English border, 1st January 1660, with 6000 men, united his troops with those which Fairfax had collected for Charles II., and entered London unopposed, although as yet he kept his views profoundly secret. His powers of dissimulation and reticence were immense. Everybody felt that the decision lay with "Old George," as his soldiers used to call him; every party courted him; he was even offered the protectorate; but while he offended nobody, he declined to connect himself with any of the sectaries, and waited patiently the course of events. His own wish (though it did not proceed from any very high-minded motive) was to bring back the Stuarts; and before long, he saw that the nation in general was thoroughly with him. On the 21st of February he called together the remaining members of the parliament which had been violently driven out twelve years before, and Charles II. was presently recalled. M. was now made Duke of Albemarle, loaded with honors, and intrusted with the highest offices in the state. But he soon retired from political affairs. In 1665, when the plague ravaged London, and every one fled that could, "Old George," as governor of the City, bravely stuck to his post, and did what he could to allay the terror and confusion. Next year, he was employed as second in command of the fleet sent under the Duke of York against the Dutch; and was defeated by Von Ruyter in a sea-fight off Dunkirk, but soon after gained a bloody victory over him off North Foreland. He died 3d January 1670. Guizot describes him as a "man capable of great things, though he had no greatness of soul." See Guizot's "Monk," Chute de la République," Skinner's "Life of Monk," Hallam's "Constitutional History," and Macaulay's "History of England."

**MONKEY** (*Simia*), a Linnean genus of *Mammalia*, of the Linnean order *Primates*, and of Cuvier's order *Quadrumania*, now constituting the family *Simiadae*. The word *M.* was formerly of almost, if not altogether, the same signification with *Ape*; but the name *ape* is now more generally applied to those *Simiadae* which have no tail, and no cheek-pouches; the name *M.* to those which have cheek-pouches and long tails, prehensile or not prehensile; whilst the name *Baboon* (q. v.) is applied to creatures considerably different from both. The smaller tailless *Simiadae* are, however, still not unfrequently spoken of as monkeys, and the term is also sometimes used to comprehend all the *Simiadae*.

Of all animals, the *Simiadae* exhibit the greatest resemblance to man, both in their general form and their anatomical structure. This is particularly the case with some of the larger apes. In none of them, however, is there a natural adaptation for the erect position so characteristic of man, which is assumed rarely, and in general only by captive individuals, as the result of training and constraint, all of the *M.* tribe preferring to walk on four feet rather than on two, but all of them being adapted for living chiefly among the branches of trees, or—according to the habits of a comparatively small number of species—among bushy cliffs, where they make use of the four extremities for prehension, as hands. Most of them leap from branch to branch with wonderful agility, and some also swing themselves from a branch by their long prehensile tail, till they can seize hold of another branch. The thumb, in all the four extremities, is opposable to the fingers, which are long and flexible; but there are some monkeys which want the thumb of the fore-limbs, or have it merely rudimentary, whilst the hind-limbs are always furnished with perfect hands. In attempting to walk erect, an ape necessarily treads, not on the soles, but on the sides of its feet, which are turned inwards, and the muscles of the legs do not enable it to maintain an erect position long or easily. This difficulty is increased by the way in which the head is affixed to the vertebral column, the *occipital foramen* being further back than in man, so that the weight of the head is thrown forward.—The face of a *M.* exhibits a grotesque resemblance to that of man: but the lower forehead, the less perfect nose, and the more projecting jaws, give it a brutal character. The dentition of monkeys is so similar to that of man, that the dental formula for very many is the same, although many others have an additional molar on each side of each jaw; but in many, the great size of the canine teeth is a marked brutal characteristic.—The digestive organs are generally very similar to those of man,

but in some of the *Simiadae*, more exclusively confined to vegetable food, there is a remarkable difference in a peculiar and very complicated structure of the stomach. —The food of monkeys consists chiefly of fruits, corn, and other vegetable substances; but most of them also catch and eat insects, and even birds, of the eggs of which they are also very fond. In captivity, they learn to eat and drink almost everything that is used by man, and shew a great fondness for sweet things, and for alcoholic liquors. —The skin of monkeys is generally covered in all parts with hair, but some have the face partially naked, and many have naked callosities on the buttocks. —Many have capacious cheek-pouches, in which they stow away food which they cannot consume with sufficient expedition. They are mostly gregarious, although to this there are some exceptions. Many of the species display strong attachments to their mates and to their offspring. One or two young are generally produced at a birth. They display a remarkable propensity and talent for imitation; and this, with their extreme agility, their curious prying disposition, and their love of trick or mischief, makes them very amusing, whether in a wild or a captive state. Many of the stories told of monkeys manifest also a high degree of intelligence, although it may be doubted if the intelligence of any of the species exceeds that of the dog or the elephant. Notwithstanding their resemblance to the human form, their imitative propensity, and their intelligence, none of the monkeys shew the smallest capacity for imitating the human voice; and their "chattering" is very unlike articulate speech.

The species of this family are very numerous, but are all confined to the warm parts of the world; Australia, however, and the South Sea Islands being destitute of them. They are divided into a number of genera, some of which belong exclusively to particular portions of the world. But in this respect, the most remarkable circumstance is the difference between those of the Old World and those of America, the geographical distribution corresponding with the division of the family into two principal groups—the monkeys of the Old World (*Catarrhini* of some naturalists), to which alone the name *Simiadae* is sometimes restricted, having the nostrils separated only by a narrow septum, and the tail wanting, short, or long, but never prehensile; the monkeys of the New World (*Platyrrhini*), the family *Cebidae* of some naturalists, having the nostrils widely separated, the tail always long, and often prehensile, most of them having also the four additional molar teeth already noticed, which none of the monkeys of the Old World possess; but none of them having cheek-pouches, which many of the monkeys of the Old World have. The most interesting genera and species of *M.* are noticed in separate articles.

**MONKEY POTS.** See *LEOTHTIDACEÆ*.

**MONK'S-HOOD.** See *ACONITE*.

**MONK'S RHUBARB.** See *DOCK*.

**MONMOUTH**, a parliamentary and municipal borough and market-town of England, capital of the county of the same name, stands amid beautiful scenery, at the confluence of the Monnow and the Wye, 21 miles west-south-west of Gloucester. Its church, dating from the 14th c., is surmounted by a lofty spire. Of its castle, the favorite residence of John of Gaunt, and the birthplace of Henry V., the ruins only remain. A building, said to be the study of Geoffry of Monmouth, is all that exists of the Benedictine monastery. Railways connect the town with Newport on the w. and Ross on the e. Ironworks, employing a number of workmen, are in operation. Pop. (1871) 5879. *M.* unites with Newport and Usk in sending a member to parliament.

**MONMOUTH**, a maritime county in the west of England, bounded on the s. by the estuary of the Severn, on the w. by Glamorgan, and on the e. by Gloucestershire. Area, 368,399 acres. Pop. (1871) 195,443. The chief rivers are the Usk, the Wye on the eastern border, and the Rumney on the western border—all of which flow south into the estuary of the Severn. The coast-line, 23 miles in length, is indented only at the mouth of the Usk (which is navigable for vessels of the largest size to Newport), and at the mouth of the Wye, which vessels ascend to Chepstow. The surface is elevated in the north and north-west (the Sugar-loaf is 1866 feet high), but the coast districts, comprising the Wentloog and the Caldecot Levels, are low and rich, and are protected from the wash of the sea by sea-walls and earthworks. In

the fertile valleys of the Usk and Wye, wheat is the principal crop; but in the less favored localities, barley and oats chiefly are grown. Coal, limestone, and ironstone abound in the mineral district of M., in the north-west of the county. This district, comprising 89,000 acres, abounds in collieries and ironworks, and is a perfect network of railways. M. was a Welsh county until the reign of Henry VIII., but the ancient language is now heard only in a few western districts. The scenery of this county is unusually beautiful; and in no part of England are to be found so many remains of feudal castles as in the eastern districts of this county. The chief remains are Raglan, Caldecot, and Chepstow castles; and Llanthony and Tintern abbays (q. v.). Roman antiquities are numerous. The county sends two members to parliament.

**MONMOUTH**, James, Duke of, natural son of Charles II., was born at Rotterdam in 1649. His mother, Lucy Walters, according to Evelyn, a "browne, beautiful, bolde, but insipid creature," came to England with her son in 1656, during the Commonwealth. She is said to have been treated as though she had been the king's wife, and was committed to the Tower; but was soon allowed to retire to France, where she died. Charles sought out the boy, and committed him to the care of Lord Crofts, who gave him his own name. On the Restoration, M., then "Mr James Crofts," came to England with the queen-dowager, and was handsomely lodged at Hampton Court and Whitehall. These honors were, in after-years, referred to by his followers as justifying their belief that he was indeed the king's legitimate son. A wealthy heiress, Anne, daughter of the Earl of Buccleuch, was selected for his wife; and before he had completed his 16th year, he was married to her, and was created Duke of Monmouth. About the year 1670, Shaftesbury put M. forward as the head of the popular party, and rival of the Duke of York (afterwards James II.). At the period of the Titus Oates' plot (1678), rumors that the "Protestant Duke" was indeed the king's legitimate son spread far and wide. The Duke of York was compelled to quit the kingdom; and parliament brought forward a bill for excluding him from the succession, when Charles suddenly dissolved it. A document was at the time issued by the king, solemnly declaring that he had never been married to Lucy Walters. M. was sent into Scotland, in 1679, to quell the rebellion. He defeated the Covenanters at Bothwell Bridge; but his humanity to the fleeing and wounded was so conspicuous, and his recommendations to pardon the prisoners were so urgent, as to bring upon him the violent censures of the king and Lauderdale. He thus became the idol of the English Nonconformists. The return of the Duke of York, and the exile of M., soon followed. In Holland, he allied himself to the leaders of the Nonconformist party, exiled like himself; and when he was allowed to return to London, he was received with such demonstrations of joy, that M. felt that he was the people's choice. In 1680, he made a semi-royal progress through the west of England, with the design, probably, of courting the Nonconformists, who were more numerous there than in any other part of the country, except London and Essex. In 1682, he traversed some of the northern counties.

The king and his brother were alarmed; and M. was arrested at Stafford, and bound over to keep the peace. He meekly confessed his participation in the Rye-House plot, accusing himself and others of a design to seize the king's person, and subvert his government. The king pardoned him, on his solemn promise to be a loyal subject to the Duke of York, in case the latter should survive the king. In 1684, M. fled to Antwerp, and remained abroad until the death of the king, when he resolved to embark for England. He landed (June 11, 1685) at Lyme-Regis, and issued a manifesto declaring James to be a murderer and usurper, charging him with introducing popery and arbitrary power, and asserting his own legitimacy and right by blood to be king of England. He was received with great acclamations at Taunton, where he was proclaimed as James II. At Frome, he heard the news of the defeat of Argyle, who, at the head of the Scottish exiles, had attempted to raise an insurrection in Scotland. Money and men were now abundant; but arms were wanting, and thousands went home for want of them. On the 5th July, he was persuaded, with only 2500 foot and 600 horse, to attack the king's forces, which, under the command of the Earl of Faversham, were encamped at Sedgemoor, near Bridgewater. M.'s troops were unable to cross a running stream or wide ditch which protected the camp, and were mowed down by the king's artillery. Their ammunition soon failed; and M. having set a cowardly example of flight, his troops were slaughtered

like sheep. About 300 of M.'s followers fell in the battle; but 1000 were massacred in the pursuit. M. was found concealed in a ditch, and was brought to London. He made the most humiliating submissions, and obtained a personal interview with James. "He clung," says Macaulay, "in agonies of supplications round the knees of the stern uncle he had wronged, and tasted a bitterness worse than that of death, the bitterness of knowing that he had humbled himself in vain." Even his prayer for "one day more," that he might "go out of the world as a Christian ought," was brutally refused. On the 15th June, he was brought to the scaffold, and beheaded on Tower Hill; the executioner performing his office so unskilfully that five blows were struck before the head was severed. The "Bloody Assize" afterwards commenced under Judge Jeffreys, when M.'s adherents paid a fearful penalty for their participation in his rash and ill-advised rebellion.

**MO'NOCHORD**, an apparatus constructed to exhibit the mathematical proportions of musical intervals. It consists of a flat board of four or eight feet long, better 16 feet, where space can be spared. The breadth of the board is according to the number of the strings, which are from two to six. The board is covered with fine white paper. A straight line is drawn from end to end below each string, and each line is accurately divided into the different proportions into which the full length of the string, as a fundamental sound, harmonically divides itself. See **HARMONIOS**. The string is fixed at one end, and rests on a bridge; while at the other end, where it also rests on a bridge, it is stretched by a tuning-peg, or by a weight. The sounds from the strings are produced by a violin-bow. The monochord is chiefly used in illustrating acoustical experiments in the proportion of intervals and temperament.

**MONOCOTYLEDONOUS PLANTS**, plants in which the embryo has one and only one Cotyledon (q. v.). The cotyledon in these plants varies extremely in form, and is often comparatively of great size, but has always a slit, from which, as germination takes place, the gemmule sprouts. The gemmule in elongating assumes an acuminate shape. Monocotyledonous plants are all Endogenous (q. v.); except the Dictyogens (q. v.), in which the endogenous structure is not perfectly exhibited. They are also *endorhizal* (Gr. *endon*, within, *rhiza*, a root); that is, the radicle is covered with a cellular sheath, and gives rise to fibrils similar to itself in structure. The leaves are generally sheathing at the base, and there embrace the stem; they also generally have simple parallel nerves connected by cross veins, the leaves of dictyogens alone being reticulated. The number of the parts of the flower is generally three, or a multiple of three. The floral envelopes, often splendid, as in lilies, tulips, &c.—are generally united as a Perianth (q. v.), instead of forming a distinct calyx and corolla. The principal natural orders of monocotyledonous plants are Grasses, *Cyperaceæ*, Palms, Orchids, *Scitamineæ*, *Musaceæ*, *Liliaceæ*, and *Iridaceæ*. The general appearance of monocotyledonous plants distinguishes them almost as perfectly as any structural characters.

Of the fossil remains of the vegetable kingdom, the smallest portion consists of monocotyledonous plants, both acotyledonous and dicotyledonous plants being much more abundant.

**MO'NODON**. See **NARWHAL**.

**MONŒCIOUS** (Gr. *monos*, one, and *oikion*, a habitation), the term used in botany to describe those plants which have the male and female parts of fructification (*stamens* and *piatils*) in different flowers, but upon the same plant. The flowers of such plants are also said to be *monœcious*. Monœcious plants form one of the classes of the Linnæan artificial system, but many occasional instances of monœcious species are to be found in genera belonging to other classes. Monœcious plants often have the flowers in catkins, sometimes the male flowers only; and often in spikes, the male flowers sometimes occupying the upper, and sometimes the under part of the same spike with the female flowers, and sometimes distinct spikes upon the same plant. Common examples of monœcious plants are the hop, box, birch, beech, alder, oak, and hazel.

**MONOGRAM** (Gr. *monos*, alone, and *gramma*, letter), a character composed of two or more letters of the alphabet, often interlaced with other lines, and used as a cipher or abbreviation of a name. A perfect monogram is one in which all the letters

of the word are to be traced. The use of monograms began at a very early date. They are found on Greek coins, medals and seals, and are particularly numerous on the coins of Macedonia and Sicily. Both on coins and in MSS., it was the practice to represent the names of states and cities by monograms, of which above 500 are known, but some have not been deciphered. Monograms occur on the family coins of Rome, but not on the coins of the earlier Roman emperors. Constantine placed on his coins one of the earliest of Christian monograms, which is to be traced in the recesses of the catacombs, composed of the first and second letters of  $\chi\rho\iota\varsigma$  (Christus), a monogram which also appeared on the Labarum (q. v.), and was continued on the coins of the succeeding emperors of the East down to Alexander Comnenus and Theodorus Lascaris. We often find it combined with the first and last letters of the Greek alphabet (Rev. i. 8). Another well known monogram is that of the name of Jesus, IHS, from the first three letters of  $\iota\eta\varsigma\omicron\upsilon\varsigma$ .

Popes, emperors, and kings of France during the middle ages were in the practice of using a monogram instead of signing their names. Almost all the coins of the French kings of the Carlovingian race bear their respective monograms, as also do those of Alfred and some of the other Saxon kings of England.

Painters and engravers in Germany and Italy have used monograms to a large extent as a means of distinguishing their works. In these, the initial letters of their names were often interwoven with figures of a symbolical character, so as to form a rebus, on the artist's name. The first typographers distinguished their publications by wood-cut vignettes, whose invention is ascribed to the elder Aldus; but besides these, each made use of a monogram or cipher, a series of which, well known to the bibliographer, fixes the identity of the ancient editions, German, Italian, and English, from the invention of printing down to the middle or end of the 16th century. For a detailed account of the monograms of early printers and others, see Brulliot, "Dictionnaire des Monogrammes" (Munich, 1832-1834); Horne's "Introduction to Bibliography," vol. ii.; and Herbert's and Ames's "Typographical Antiquities."

**MONOGRAPH**, a work in which a particular subject in any science is treated by itself, and forms the whole subject of the work. Monographs are entirely of recent date, and have contributed much to the progress of science. In botany especially, monographs of orders and genera are very numerous; and some of them are among the most splendid and sumptuous of scientific works.

**MONOLITH**, a monument, column, obelisk, statue, or other structure formed of a single stone. In India, there are examples of monolithic temples, the whole being cut out of the solid rock.

**MONOMANIA** has loosely been made to represent every form of partial insanity; but has been more rigidly defined as that mental condition in which a single faculty, or class of faculties or associations, become diseased, the mind generally remaining healthy. Slight and solitary aberrations, such as where a savage antipathy to cats coexists with a love for human kind; where there appears to be an uncontrollable tendency to steal, to squander, to drink, to destroy, are of common occurrence, and are supposed to be compatible with the exercise of intelligence, and with the discharge of many of the ordinary duties of life. By a more strict limitation, the term has been confined to such affections as involve the emotions and propensities alone. It is, however, held that, notwithstanding its apparent integrity, the whole mind is involved or influenced by the presence of such morbid conditions, at least while they are predominant. It is undoubtedly difficult to point out in what manner the belief, e. g., that a particular organ has been transmutated into glass, can interfere with or render the memory, or the power of instituting comparisons, defective and untrustworthy; yet it is legitimate to receive with caution every manifestation of powers so constituted that they fail to detect the incongruities and absurdities with which they are associated; or, having detected the real character of these errors, are unable or unwilling to cast them out, or to disregard them. There is much countenance given to this theory by facts which indicate that even trivial forms of mental obliquity are connected with an unsound organisation; and that particular and rarely recognised monomanias are invariably associated with the same structural alteration. The unhealthy elevation of the sentiment of cautiousness, for example, especially where it amounts to fear of death, panic, or panphobia, is a symptom of disease of the heart

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and large blood-vessels; while the monomania of ambition, or optimism, as it has been styled, is the concomitant of the general paralysis of the insane. It will be obvious, from the definitions previously introduced, that the species or varieties of monomania must correspond to the faculties or phases of the human mind, and to their combinations. Several great divisions, however, have been signalled, both on account of their frequency and of their influence upon the individual and upon society. 1. Monomania of Suspicion, comprehending doubts in the fidelity and honesty of friends and those around, belief in plots and conspiracies, the dread of poison; and where, as is often the case, it is conjoined with cunning, the propensity to conceal, mystify, and deceive. This malady has frequently been observed in intimate connection with cancer and malignant growths. 2. Monomania of Superstition and Unseen Agencies, where credulity, mingled with religious awe, peoples the external world with spectres, omens, mysteries, magnetism; and the imagination with horrors or ecstatic reveries. Insensibility to pain, or indifference to external injuries, has been observed as a characteristic of individuals affected with this disease. 3. Monomania of Vanity, or Euphoria, where display and ostentation are indulged, without reference to the position and means of the patient. 4. Monomania of Fear. 5. Monomania of Pride and Ambition. 6. Kleptomania (q. v.). 7. Dipsomania (q. v.). If it can be proved that such morbid tendencies, as have been here mentioned, and others still less prominent, are merely salient points of a great breadth and depth of mental disease, the plea of insanity may justifiably be employed more frequently in the consideration of criminal acts.—Esquirol, "La Monomanie;" Bayle, "Maladies du Cerveau;" Stephens's "Criminal Law of England," p. 92.

**MONONGAHE'LA**, a river which rises in the Alleghany Mountains in Virginia, United States of America, and flowing north into Pennsylvania, unites with the Alleghany at Pittsburg to form the Ohio. Its whole length is 300 miles. It is navigable for steam-boats to Brownsville, 60 miles, with dams and locks for low water. Vast seams of coal open in its high banks, from which flat boats are loaded, and floated down with the current through the Ohio and Mississippi.

**MONOPT'RAL**, a temple formed of an open circle of columns carrying a roof, and without a cell.

**MONO'PHYSITES**, the name given to a widely ramified sect of Christians who hold that Christ has only *one* nature (Gr. *monos*, one; *physis*, nature), a human nature become divine. Monophysite views were first decidedly put forward in the controversy against Nestorius. Cyril having expressed the opinion that the flesh of the Logos was essential to his personality, the archimandrite Eutyches (q. v.) went on to assert a deification or apotheosis of the flesh of Christ, and obtained the consent of a synod at Ephesus, in 449, commonly called the "Synod of Robbers," to this doctrine; but he and his adherents (at first called after him **EUTYCHIAN**) were condemned as heretics by the Council of Chalcedon in 451. It was after this council that the name *Monophysites* began to be used. The decision of the council, however—viz., that in Christ *two* natures, neither interfused, changed, nor divided, were united in *one* person, and constituted *one* hypostasis—was not calculated to allay, but rather to increase discord. Accordingly, the strife grew hotter. The Asiatic and Egyptian clergy, strongly opposed to Nestorianism, were generally inclined to Monophysite views, and received countenance from the Emperor Basiliscus. After long, and often bloody contests between the supporters of the opposite opinions, the M. formally separated from the orthodox church. This separation took place in the first half of the 6th c., when the imperial protection hitherto bestowed upon them was lost by the alliance of the emperors Justin and Justinian with the Latin Church. Besides, they had not maintained unity among themselves. As early as 452, when the Emperor Zeno published his famous "Henoticon," or formula of concord, it was accepted by several of the more moderate Monophysites. This roused the indignation of the extremest sectaries; they renounced fellowship with their laxer brethren, and formed a sect of their own. They were called *Akephaloi*, and formed the *ultras* among the Monophysites. Controversies arose also in 519 on the question, whether or not the body of Christ was corruptible. The Severians—adherents of Severus, a deposed bishop of Antioch—affirmed that it was; the Julianists, or Gajanites, followers of Bishop Julianus or Gajanus, denied it. The former were consequently called (Gr.) *Phthar*

*tolatristæ*, (Lat.) *Corrupticolæ* (Worshippers of the corrupt); the latter, *Aphthartodocetæ* (Believers or Teachers of Incorruption), and sometimes—as an incorruptible body could only be apparent, and not real—*Phantasiasts*. The *Aphthartodocetæ* split again on this other point—whether or not Christ's body was created; the *Aktistotol* (Gr. *ktizo*, to create) asserting that it was not created, and the *Ktistolatristæ*, that it was. The Severians, called also, after one of their bishops, *Theodosians*, finally got the upper hand, and excommunicated their opponents, including another sect, the *Aguoetæ*, who denied that Christ as a man was omniscient. About 560, the Monophysite Askanages, and after him the Christian philosopher Philoponus, ventured to speak of the Three Persons in the Godhead as Three Gods. This, however, was reckoned heretical even by the M. themselves, and was the occasion of a large recession to the bosom of the Catholic Church. Monophysite communities continued strongest in Egypt, Syria, and Mesopotamia, where they maintained a regular ecclesiastical order under their own patriarchs of Alexandria and Antioch; and after the Syrian, Jakob Baradaenus (Al-Baradai, died about 578), had drawn up for them an ecclesiastical constitution, they formed the independent churches of the *Jacobites* (q. v.) and *Armenians*. See ARMENIAN CHURCH. The Coptic and Abyssinian churches are also Monophysite in doctrine.

**MONO'POLI**, a town of Southern Italy in the province of Bari, situated on the Adriatic shore, in a pleasant and healthy plain, 28 miles east-south-east of Bari. Pop. about 20,000. It is supposed to be of Grecian origin, the name in Greek signifying the *solitary city*. It is surrounded by walls, and has a fortress constructed in 1662 by Charles V. The neighboring territory yields an immense quantity of olive oil.

**MONO'POLY**, from the Greek, signifies sole selling or individual selling, and has always been used to express a limitation to one or more persons of the right or power to conduct business as a trader. It is generally used in a bad sense to express something injurious, but economic science has lately very much narrowed the field over which its injurious character is supposed to extend. In the first place, it must be created by force; if it come in the natural course of trade, it is generally beneficial. Thus, to a village where three or four traders have conducted a small lazy business, drawing large profits, there comes a capitalist, who sets up a large concern on the ready-money system, and, by selling good articles at a low rate, absorbs all the business. He is of course abused as a monopolist by the ineffective persons he has superseded; but his presence is a blessing to the community generally. If, however, he had gone to the village, not to compete with others, but with a royal patent in his pocket securing to him the exclusive trade of the village, as he could sell at his own price, and make a fortune without trouble, he would of course be, like the old royal monopolists, a calamity to the people.

A careful distinction must be preserved between monopoly and property—that is to say, an exclusive right to *trade* must be separated from an exclusive right to *possess*—for, while the law of property exists, possession will always be exclusive. If, then, a trade can only be conducted with large capital, it must fall to those who either singly, or by co-operation, can command that capital; and the answer to all complaints on the part of others is, that since capitalists can best serve the public, it is best for the public that capitalists should be allowed to do so. The old corn-laws and landed property conjoined to produce one of the best illustrations of the distinction. The power of producing grain within Britain has always been of necessity limited to those who have, either as owners or tenants, the command of the land. Forfeit all the land in the country to-morrow, and proclaim the production of grain to be free, the result would only be a change of ownership; for those who by their good-luck, or more probably by their power, got hold of rich old wheat-lands, would produce their grain much cheaper than those who got the poor lands, and, selling the produce at the same price, would pocket the difference, which would, in fact, just be rent gained by them as the new landlords. But when dealers offered the people grain from abroad, and the corn-laws rendered it impossible to sell that grain in this country, then there was a monopoly in favor of the home-producer, having the effect of artificially raising prices, and otherwise disturbing trade.

A deal of legislation was wasted by our ancestors in enactments to prohibit peo-



ple from creating monopolies by that fair competition which is now considered the true healthy development of trade. Some account of them and of their repeal will be found in the article **ENGROSSING**. When British trade was increasing in the 16th c., it found some old powers alleged to be inherent in the royal prerogative for conferring exclusive trading rights, which led to much oppression and loss. In Queen Elizabeth's parliament of 1597, a complaint was made that, for the benefit of favored courtiers, oppressive monopolies had been granted, not only for the sale of foreign luxuries, but for salt, leather, coal, and other articles of ordinary consumption. Queen Elizabeth said she "hoped her dutiful and loving subjects would not take away her prerogative, which is the choicest flower in the garden, and the principal and head-pearl in her crown and diadem." Parliament returned to the charge, however, in 1601, when, on the reading over of the list of monopolies, a theatrical scene occurred by a member calling out: "Is not bread among the number?" and on this producing a sensation, continuing: "Nay, if no remedy is found, bread will be there before the next parliament." In 1621, parliament took proceedings against Sir Giles Mompesson, charged with an oppressive use of his patents monopoly. Four years afterwards, an act was passed limiting this power in the crown. It leaves only the right to grant a limited monopoly in the manufacture of his invention to any inventor, and this is the origin of the present patent law. See **PATENT**.

**MONO'STOMA**, a genus of Trematoid worms, so called from having only a single sucker, which is situated anteriorly, and surrounds the mouth. It belongs to the *Trematoda Digenea* (of Van Beneden), all of which present the phenomena of alternation of generations, the earlier or larval forms occurring chiefly in molluscs, while the perfect worms are found, for the most part, in vertebrate animals. Among the species of this genus occur *M. flavum*, found in waterfowl (the larva being the *Cercaria ephemera*, which is common in *Planorbis*, &c.), *M. mutabile*, found in various birds, and *M. lentis*. The last-named species derives its specific name from its having been found by Von Nordmann in a lens extracted in a case of cataract. Cobbold and other distinguished helminthologists are inclined to believe that this is not an independent species, but that it is identical with the *Distoma ophthalmiobium* of Diesing.

**MONOTHEISM**, the term usually employed to denote a belief in the numerical unity (*unus numero*) of the Godhead, or belief in and worship of one God. It is thus the opposite of *Polytheism* (q. v.). See **GOD**. The "doctrine of the Trinity" is thought by some to be incompatible with the monotheism taught by Jesus Christ, and is therefore rejected as no part of his teaching. See **UNITARIANS**. Mohammedans and Jews hold the doctrine of the "unity of God," even more rigorously in some respects than modern Christians, at least they reject with vehemence the least approach to a Trinitarian conception of the Deity. The majority of mankind are polytheists.

**MONOTHELISM** (Gr. *monos*, single, and *thelein*, to will), a modification of Eutychianism, which was introduced after the condemnation of that doctrine by the Council of Chalcedon. It consisted in maintaining that, although Christ had two natures, yet, these natures possessed or acted by but a single will, the human will being merged in the divine, or absorbed by it. The author, or at least the most active propagandist of this doctrine, was Sergius, Patriarch of Constantinople, who obtained for it the support of the Emperor Heraclius; and its progress was materially forwarded by the silence which, at the instance of Sergius, and under his representations, the pope, Honorius (q. v.), was induced to maintain regarding the question. The doctrine was formally condemned in the sixth general council held at Constantinople, in the year 680, with which condemnation it is commonly said that the early controversies on the incarnation were ended. See **EUTYCHES** and **MONOPHYSITES**.

**MONOTREMATA** (Gr. *monos*, single *trēma*, an opening), the lowest order of mammalia, in many of their characteristic points indicate an approximation to birds. The skull is smooth; the brain-case very small as compared to the face; the snout much prolonged, and the jaws unprovided with soft movable lips, and not furnished with teeth. (In the ornithorhynchus, there are two horny plates in each half-jaw, which act as teeth, while in the echidna even these substitutes for teeth are wanting.)

The cranial bones coalesce, as a bird's, at a very early period, and leave no signs of sutures. The external ear is altogether absent; while the eyes, though small, are perfectly developed.

The bones of the shoulder, forming the scapular arch, are unlike those of any other mammals, and in some respects resemble those of birds, and in other respects those of reptiles. At the top of the sternum is a T-shaped bone, formed by the union of the two clavicles, corresponding to the *furculum* in the bird's skeleton. The coracoid bones, which in other mammals are mere processes of the scapula, are here extremely large, and assist, as in birds, in strengthening the scapular arch; while the scapulae themselves are produced beyond the socket of the humerus (the glenoid cavity), so as to articulate with the sternum.

The pelvis is provided with marsupial bones, although these animals do not possess a pouch.

The feet have five toes, armed with long nails; in addition to which, the hind-feet of the males are provided with a perforated spur-like weapon, which is connected with a gland. The Australian aborigines believe the wounds made by this spur to be poisonous; but there is no scientific evidence of the fact.

The ovaries are analogous to those of birds, the right ovary being comparatively undeveloped, while the left forms a racemiform mass. The orifices of the urinary canals, the intestinal canal, and the generative canal, open, as in birds, into a common cloaca, from which circumstance the order *Monotremata* derives its name. The mammary glands, of which there is only one on each side, are not provided with nipples, but open by simple slits on each side of the abdomen.

This order includes only two or three species, all natives of Australia or Van Diemen's Land, which, however, form two families—the *Ornithorhynchidae* (see DUCK-BILL), and the *Echidnidae* (see ECHIDNA).

No fossil remains of any animals of this order have as yet been discovered.

**MONOTROPA'CEÆ**, a small natural order of exogenous plants, allied to *Ericæ* and *Pyrolacææ*; but remarkably differing from both in their habit. They are herbaceous plants with scales instead of leaves, and grow parasitically on the roots of pines and other trees, in the northern parts of the world. The only British species is *Monotropa hypopitys*, sometimes called *Yellow Bird's Nest*. The whole plant has a pleasant smell.

**MONREA'LE**, a city of the island of Sicily, province of Palermo, and 5 miles south-west of the city of that name, on the flank of a steep hill. Pop. 15,561. It has a cathedral, a palace, several conventual establishments, and possesses a healthy climate. Its chief source of wealth is its export trade in oil, corn, and fruit, almonds being one of its most important products.

**MONRO**, Alexander, an eminent anatomist, and founder of the medical school of Edinburgh, styled *primus* to distinguish him from his son and successor, was born at London, September 8, 1697. His grandfather, Sir Alexander Monro of Bearcrofts, a colonel in the army of Charles II. at the battle of Worcester in 1651, was afterwards an advocate at the Scottish bar; and his father, John Monro, for some years a surgeon in the army of King William, in Flanders, on leaving it, entered into practice in Edinburgh. Alexander studied at London under Cheselden, at Paris under Bouquet, and at Leyden under Boerhaave, and in 1719 passed as a surgeon in Edinburgh. In January 1720, he was elected by the town-council first Professor of Anatomy in the university. Of the establishment and building of the Royal Infirmary of Edinburgh, he was one of the two principal promoters, and after it was opened, he delivered clinical lectures there for the benefit of the students. In January 1756, he received the degree of M.D., and in March following was elected a Fellow of the Royal College of Physicians of Edinburgh. In 1759, he resigned the anatomical chair to his youngest son, the subject of the following notice, but continued his clinical lectures at the Infirmary. His principal works are—"Osteology, or Treatise on the Anatomy of the Bones" (Edin. 1726, 8vo); "Essay on Comparative Anatomy" (Lond. 1744, 8vo); "Observations, Anatomical and Physiological" (Edin. 1768, 8vo); and an "Account of the Success of Inoculation of Small-pox in Scotland" (Edin. 1765, 8vo). He was secretary of a Society at Edinburgh, which published six volumes of "Medical Essays and Observations," many of them contributed by himself. Two more volumes of "Essays, Physical and Literary," were

subsequently issued by the same Society, under the name of the Philosophical Society. Dr M. died July 10, 1767. He was a Fellow of the Royal Society of London, and a member of the Royal Academy of Surgery of Paris.

MONRO, Alexander, *secundus*, an eminent physician and medical professor, youngest son of the preceding, was born at Edinburgh, March 24, 1738. He studied at the university of that city; and in October 1755, obtained the degree of M.D. In July following, he was appointed joint Professor of Anatomy and Surgery with his father in the university of Edinburgh. He attended for some time the anatomical lectures of Professor Meckell at the university of Berlin. He also visited Leyden. Admitted a licentiate of the Edinburgh Royal College of Physicians, 1758, he was elected a Fellow, 1759, and was afterwards president. On the resignation of his father in the latter year, he became full Professor of Anatomy, and also succeeded him as Secretary of the Philosophical Society, which in 1783 was incorporated by royal charter, and took the name of the Royal Society of Edinburgh. In 1757, he published at Berlin a short treatise, "*De Venis Lymphaticis Valvulosis*," in support of the theory, that the valvular lymphatics over the whole of the animal body are one general system of absorbents; which led to a controversy with Dr William Hunter of London. Among his other works are—"On the Structure and Functions of the Nervous System," a large illustrated folio volume (Edin. 1783); "On the Structure and Physiology of Fishes," also an illustrated folio volume (Edin. 1785); "Description of all the Bursæ Mucosæ of the Human Body" (Edin. 1788); and "Three Treatises on the Brain, the Eye, and the Ear," illustrated by plates (Edin. 1797, 4to). He was a member of the Royal Academies of Paris, Madrid, Berlin, Moscow, and other learned institutions, and one of the first Fellows of the Royal Society of Edinburgh, to whose "Transactions" he contributed various papers. In 1793, his son, Dr Alexander Monro, *tertius*, was conjoined with him in the professorship; and in 1808 he finally retired from the anatomical chair, and from his extensive practice. He died October 2, 1817, in his 87th year.

MONRO, Alexander, *tertius*, anatomical professor, son of Dr Alexander Monro, *secundus*, born at Edinburgh, November 5, 1773, was educated at the High School and university of that city, and studied medicine, anatomy, and surgery in London. In 1793, he became joint Professor of Anatomy with his father, and the following year he took his degree of M.D. In 1803, he instituted the class of Practical Anatomy in the university of Edinburgh; and in 1808 he succeeded his father in the anatomical chair. In 1828, he was President of the Royal College of Physicians of Edinburgh; and he contributed many valuable papers to its "Transactions." He was also a Fellow of the Royal Society of Edinburgh. He retired from his chair in 1847, with the title of Emeritus Professor of Anatomy; and thus ended the connection between the college of Edinburgh and the family of Monro, which lasted for more than a century and a quarter. He died at his seat of Craiglockart, near Edinburgh, March 10, 1859. He was the author of "Observations on Crural Hernia," plates (Edin. 1803); "The Morbid Anatomy of the Gullet, Stomach, and Intestines," plates (Edin. 1811); "Outlines of the Anatomy of the Human Body" (4 vols. 8vo, Edin. 1813); and other professional works.

MONROE', a city of Michigan, United States of America, is situated on the river Raisin, 2 miles from Lake Erie, and 52 miles south-west of Detroit. It is the eastern terminus of the Michigan Southern Railway. It has a large court-house, 7 churches, woollen manufactures, flour-mills, &c. Pop. (1860) 4280. M. was settled by the French in 1776.

MONROE, James, fifth president of the United States of America, was born in Westmoreland County, Virginia, April 28, 1758. He was descended from a Captain Monroe of the army of Charles I., who emigrated, with other Cavaliers, to Virginia. James M. entered the revolutionary army at the age of 18, as a cadet, and was present at several battles; but having lost his rank in the army by serving as aide-de-camp, he commenced to study law with Jefferson. In 1782, he was elected to the Assembly of Virginia, and at the age of 23, to the Executive Council. Next year he was elected to Congress, where he took an active part in the movements for framing a new constitution. He joined with Patrick Henry and other leading States' Rights men in opposing the ratification. He feared the power and encroach-

ment of the Federal government. He was afterwards sent by Washington as minister to France, and was received with singular enthusiasm by the revolutionary government. He was, however, soon recalled, for having too decided French sympathies. In 1799, he was elected governor of Virginia; and in 1803 sent by Jefferson as minister to France, to purchase Louisiana, which vast territory he secured for 15,000,000 dollars. He was now employed for several years in diplomacy in England and Spain. On the election of Mr. Madison to the presidency, he was made Secretary of State, and also performed the duties of Secretary of War. In 1816, his eminent services were rewarded by his being elected President of the United States by the Democratic Republican party, and he made himself very popular. The acquisition of Florida from Spain, and the settlement of the vexed question respecting the extension of slavery by the Missouri Compromise, by which, after the reception of Missouri as a slave state, the institution was prohibited above the line of latitude  $36^{\circ} 30'$ , helped to secure his re-election in 1820. His most popular acts, perhaps, were the recognition of the independence of Mexico and the South American republics, and the promulgation of what has since been called the "Monroe Doctrine," in which he declared the American policy of "neither entangling ourselves in the broils of Europe, nor suffering the powers of the Old World to interfere with the affairs of the New," and that "any attempt to extend their system to any portion of this hemisphere, would be dangerous to our peace and safety." In 1822, he retired to his seat at Oak Hill, Loudoun County, Virginia; but he still continued in the public service. After being twice president, he acted as justice of the peace, a visitor of the university of Virginia, and member of a State Convention; but a profuse generosity and hospitality caused him to be overwhelmed with debt, and he found refuge with his relations in New York, where he died in 1831—like his predecessors, Adams and Jefferson, on the 4th of July. He was an honorable and able statesman, though not a speaker or a man of brilliant talents.

**MONS** (Flem. *Berghen*), an important town of Belgium (formerly fortified), capital of the province of Hainaut, on the Trouille, 35 miles south-west of Brussels. Its fortifications were renewed and strengthened since 1818, but in 1866, in accordance with the new arrangement for the defence of the country, they were demolished. The immediate vicinity can be laid under water by altering the course of the Trouille. The *Canal de Condé* connects the town with the Scheldt, and there is communication by railway with Brussels, Valenciennes, Charleroi, &c. Its principal architectural ornament is the cathedral of St Wandru, dating from the 15th and 16th centuries—a masterpiece of Gothic. The chief manufactures are woollen and cotton goods, cutlery, small-ware, and sugar-refining. The vicinity forms an extensive coal-field, with about 400 pits. A large trade is carried on in coals, flax, hemp, horses, and cattle. Pop. (1875) 24,539.

**MONSIELICE**, a walled town of North Italy, 13 miles south-east of Padua, on the canal of Monselice, which extends from Padua to Este. M. was a place of importance in the middle ages. It has several silk-mills. Pop. 8160.

M., supposed to occupy the site of a Roman station, was made the capital of Hainaut by Charlemagne in 804. During the 17th and 18th centuries, it was frequently the object of contest between France and Austria.

**MONSOON** (Malayan, *Musim*) is derived from the Arabic word *Musim*, a set time or season of the year, and is applied to those winds prevailing in the Indian Ocean which blow from the south-west from April to October, and from the opposite direction, or north-east, from October to April. The existence of these winds was made known to the Greeks during the Indian expeditions of Alexander, and by this knowledge, Hippalus was emboldened to sail across the open sea to Muzeris, the emporium of Malabar. The monsoons depend, in common with all winds whether regular or irregular, on the inequality of heat at different places and the earth's rotation on its axis; but more particularly they are occasioned by the same circumstances which produce the trade-winds and the land and sea breeze, being, in fact, the combined effect of these two sets of causes.

If the equatorial regions of the earth were entirely covered with water, the trade-winds (see **TRADE WINDS**) would blow constantly from the north-east in the north, and from the south-east in the south of the torrid zone, with a belt of variable winds and

calms interposed; the whole system, following the sun's course, moving northward from December to June, and southward from June to December. But, especially in the eastern hemisphere, large tracts of land stretch into the tropics, and give rise to the extensive atmospheric disturbances for which those parts of the earth are so remarkable. During the summer half of the year, the north of Africa and the south of Asia are heated to a higher degree than the Indian Ocean, while Australia and South Africa are much colder. As the heated air of Southern Asia expands and rises, and the colder air from the south flows in to supply its place, a general movement of the atmosphere of the Indian Ocean sets in towards the north, thus giving a *southerly* direction to the wind; but as the air comes from those parts of the globe which revolve quicker to those which revolve more slowly, an easterly direction will be communicated to the wind; and the combination of these two directions results in the south-west monsoon, which prevails there in summer. Since, during winter, South Asia is colder than the Indian Ocean, which, again, in its turn, is colder than South Africa, a general motion of the atmosphere sets in towards the south and west. As this is in the same direction as the ordinary trade-wind, the effect in winter is not to change the direction, but only to increase the velocity of the trade-wind. Thus, while south of the equator, owing to the absence of sufficiently large tracts of land, the south-east trade-winds prevail throughout the year; on the north of the equator we find the south-west monsoon in summer, and the north-east in winter; it being only in summer and north of the equator that great changes are effected in the direction of the trade-wind.

Similar, though less strongly-marked monsoons prevail off the coasts of Upper Guinea in Africa, and Mexico in America. The east and west direction of the shores of these countries, or the large heated surfaces to the north of the seas which wash their coasts, produce, precisely as in the case of South Asia, a south-west monsoon in summer. As might have been expected, the monsoon off the coast of Mozambique is easterly, and that off the coast of West Australia north-westerly. The trade-winds also suffer considerable change in their direction on the coasts of Brazil, Peru, Lower Guinea, &c. These, though sometimes considered monsoons, are not truly such, for they do not change their directions periodically, so as to be opposite to each other, like true monsoons, but only veer through a few points of the compass. For a fuller account of these partial deflections, see TRADE-WINDS.

In April, the north-east monsoon changes into the south-west; and in October, the south-west into the north-east. These times depending on the course of the sun, and consequently varying with the latitude, are called the breaking up of the monsoons, and are generally accompanied by variable winds, by intervals of calm, and by furious tempests and hurricanes.

Monsoons, when compared with the trade-winds, will be found to play a most beneficial and important part in the economy of the globe. Their greater velocity, and the periodical changes which take place in their direction, secure increased facility of commercial intercourse between different countries. But the full benefits following in their train are not seen unless they be considered in their relation to the rainfall of Southern Asia. Indeed, the fertility of the greater part of this fine region is entirely due to the monsoons; for if the north-east trade-wind had prevailed there throughout the year, Central and Western India, and many other places, would only have been scorched and barren saharae. The rainfall of India depends entirely on the monsoons. The coast of Malabar has its rainy season during the south-west monsoon, which brings thither the vapors of the ocean. On the Coromandel coast, on the other hand, it is the north-east monsoon which brings the rain from the Bay of Bengal. The two coasts of Hindustan have therefore their seasons reversed, the dry season of the one corresponding with the wet season of the other.

MONSTRANCE (Lat. *monstrare*, to shew), called also OSTENSORY, the sacred utensil employed in the Roman Catholic Church for the purpose of presenting the consecrated host for the adoration of the people, as well while it is carried in procession, as when it is exposed upon the altar on occasions of special solemnity and prayer. The use of the monstrance probably dates from the establishment of the festival of Corpus Christi in the 13th century. It consists of two parts, the foot or stand upon which it rests, and the repository or case in which the host is exhibited. The latter contains a small semicircular holder called the *lumula*, or crescent, in which the host is fixed; and it appears anciently to have been of a cylindrical or

tower-shaped form, in the central portion of which, consisting of a glass or crystal cylinder, the host was placed. At present, it is more commonly in the form of a star or sun with rays, the central portion of which is of glass or crystal, and serves to permit the host to be seen. This portion, or at least the crescent, is of gold or of silver gilt; the rest is generally either of the precious metals, or at least gilt or silvered, although the lower portion is occasionally of bronze, artistically wrought. In many cases, it is of most costly materials and workmanship. The monstrance, like the other vessels used in the Eucharistic service, is consecrated by a bishop, or a priest delegated by a bishop. By a peculiar usage of the city of Lucerne, in Switzerland, the Eucharist is always carried in the monstrance, when being borne to the sick.

**MONSTROSITY**, in Anatomy. When an infant, or the young of any animal comes into the world impressed with morbid changes, which occur only in fetal life, and of which it has never been observed that they have originated in the same way after birth, such an infant or young animal is said to be a monster or monstrosity. Monsters were formerly regarded as prodigies of nature; and in the dark ages, their occurrence in the human species was usually ascribed to the intercourse of demons and witches. It is now perfectly understood that the formation of those apparently anomalous beings may be accounted for by the same laws as those which govern the formation of perfect individuals—the only difference being, that these laws in the case of monstrosity are more or less arrested or otherwise perverted.

Amongst the principal causes of monstrosity may be mentioned: 1. Something deficient or abnormal in the generative matter of one or both parents, because, as has been shewn in the article **HEREDITARINESS**, malformations are frequently transmitted from parents to the children. Here the morbid change is impressed upon the fetus at the moment of impregnation. 2. Some morbid condition of the maternal organs or constitution may exercise a disturbing influence upon development. 3. Diseases and abnormal states of the placenta, of the membranes of the ovum, and of the umbilical cord, may induce an arrest of development; for example, it may be easily understood how abnormal shortness of the cord may favor the origin of fissure of the abdomen; while a cord of disproportional length may coil round one of the extremities, and by constriction may dwarf it, or even amputate it. 4. Morbid influences acting directly on the fetus, as mechanical injuries and diseases affecting it, are the most frequent causes of malformations. From the experiments of several observers, it has been shewn, that by submitting hens' eggs to various mechanical influences during incubation, the development of the embryo may be interrupted, or modified in such a manner as to give rise to malformations; and many observations tend to prove, that mechanical influences affecting the womb (kicks, blows, or falls) in the early months of pregnancy, produce certain malformations, by causing an arrest of development. Moreover, the fact, that certain malformations usually occur only in twin or triplet pregnancies, favors the view, that certain monstrosities are due to pressure and confined space.

Of the various classifications of monstrosities, the following is perhaps the best: 1. Malformations in which certain parts of the normal body are entirely absent, or are too small. 2. Malformations produced by fusion or coalescence of organs. 3. Malformations in which parts naturally united, as in the mesial line of the body, are separated, and clefts or fissures occur. 4. Malformations in which natural openings are closed. 5. Malformations of excess, or in which certain parts have attained a disproportional size. 6. Malformations in which one or more parts have an abnormal position. 7. Malformations of the generative organs.

The *first class* includes (1) completely shapeless malformations, in which the monster presents the appearance of a lump or mass, with no indication of definite organs; (2) malformations which consist of only a more or less rudimentary trunk, with no head or extremities; (3) trunkless monsters, in which the inferior parts of the body are wanting, and little more than a rudimentary head is present, which, instead of neck and trunk, is furnished with a pouch-like appendage, containing rudimentary viscera and pieces of bone; (4) malformations in which the head and sometimes a part of the upper part of the body, are wanting, constituting acephalic monsters, which are by no means rare, the number of recorded cases in the human subject being over 100; (5) malformations in which the whole head is not absent, but some of its component parts are wanting—as, for example, the brain, some of the cranial bones, the nose, or the eyes; (6) cases in which the extremities are absent or

imperfect to a greater or less degree—for example, they may be mere stumps, with the fingers and toes either absent or rudimentary, or the hands and feet may appear to exist independently of arms and legs, and to be inserted immediately into the trunk; (7) cases in which all the organs may be present, but some of them may be too small—thus, there may be general dwarfishness, or the head or limbs may be abnormally small. None of the monsters of this class, except those included in the last two groups, are viable.

In the *second class* are included such cases as (1) the various forms of *cyclopia*, or coalescence of the eyes; these malformations are not very rare in the human subject, and are of frequent occurrence in pigs and other animals; although usually born alive, these monsters are not viable; (2) coalescence of the lower extremities either into a common limb, which supports two feet, or into an undefined tail-like mass; (3) minor amalgamations, which do not affect vitality, as more or less perfect coalescence of the fingers and toes.

The *third class* embraces such cases as (1) fissures of the cranium, which are generally due to hydrocephalus in the fœtus; (2) harelip and cleft palate; (3) fissures on the neck, whose origin is due to the respiratory clefts—which, during the formation of the embryo, appear in the cervical region, not uniting at an early stage, as in the normal condition, but remaining more or less open; (4) fissures of the vertebral arches of the spinal column, occasioning the affection known as *spina bifida*; (5) fissures of the thorax, in which case the lungs or heart are more or less exposed; (6) fissures of the abdomen.

The malformations of the *fourth class* include congenital closure of the anus, the mouth, the nostrils, &c.

The malformations of the *fifth class* may be arranged in two divisions, according as certain parts are too large, or there are supernumerary organs.

The *sixth class* is very extensive, and embraces many varieties. One or more parts may be disproportionally large—as, for example, the head in cases of congenital hydrocephalus; or there may be one or several supernumerary organs—a sub-class which presents a very great range, from the simplest cases, in which a single joint of a finger is supernumerary, to those of a highly complicated nature, when two or even three bodies are united by some one point. There may be a single head and trunk and supernumerary parts—as, for example, supernumerary teeth, vertebrae (giving rise to the formation of a tail in the human subject), ribs, mammae, fingers, toes, &c.; or there may be malformations with more than one head and trunk—double, or even triplet monsters. This sub-class is divisible into two groups, according as the united individuals are equally developed, or as only one is developed; the second being more or less atrophied, and forming a parasitic appendage to the first. As examples of the first group, we mention (1) duplication of the head and upper part of the vertebral column; (2) duplication of the head, neck, and upper extremities, while the chest and abdomen are single, or fused into one another (in this group, we must place the twin-monster, Rita Christina, who was born in Sardinia in March 1829, and was brought alive to Paris, where she died in the November of that year); (3) almost complete duplication, with separation of the two bodies, except at a single spot, as in the case of the Siamese twins; (4) triplet monsters, such as the child with three heads born in 1833 in Catania (see Geoffroy St Hilaire, "Histoire des Anomalies de l'Organisation," vol. iii. p. 327). To the second group belong such cases as the following: (1) a perfect individual may bear on its head another head, with traces of the rest of the body; (2) on a well-developed body, a second, smaller and defective one, may be situated, which, after birth, does not increase in size; (3) in a more or less perfectly developed individual, there may be concealed, commonly in the abdomen, parts of a second individual—a condition which has received the name of *fœtus in fœtu*, and which is most probably caused by the inclusion of one germ by another.

To the *sixth class* belong (1) those cases in which there is a reversal of the position of the internal organs—when the heart and spleen lie upon the right, and the liver and cæcum on the left side; (2) anomalies in the course and distribution of individual vessels.

The malformations constituting the *seventh class* have been sufficiently noticed in the article HERMAPHRODITISM.

The term *Teratology* (from the Greek words *teras*, a prodigy, and *logos*, a dis-

course) is now frequently applied to the history and science of monstrosities.—For further information on this subject, the reader is referred to Geoffroy St Hilaire, "Histoire des Anomalies de l'Organisation" (3 vols. 1832—1836); Otto, "Monstrosum & excentricum Descriptio Anatomica" (1841); and to the article "Teratology," by Vrolik, in "The Cyclopædia of Anatomy and Physiology."

**MONSTROSITY**, in Botany, is a malformation or abnormal development of any part of a plant. It may take place, however, at any period of the growth of a plant, as to any new organ that is developed, and sometimes merely affects a particular organ or some portion of a plant, as a particular leaf, flower, petal, sepal, &c., or the leaves or flowers of a particular branch, whilst in other cases all the organs of the same kind exhibit the same abnormal character. As in animals, it is now well known that monstrosities in plants are the result of special conditions affecting the operation of ordinary natural laws; and the study of monstrosities is very important in relation to that of the nature, development, and metamorphosis of organs. In the article **METAMORPHOSIS OF ORGANS**, some of the most frequent monstrosities are alluded to. Monstrosities in plants are not always, as in animals, reckoned deformities. *Double flowers* afford a familiar example of an opposite kind; although with regard to the plant itself they have the effect of unfitting it for one of the functions of a perfect plant, reproduction by seed.

**MONTAGNA'NA**, a town of Northern Italy, in the province of Padua, situated pleasantly on the banks of a canal, Il Fiumicello, 82 miles south-west of Padua. It is still protected by walls and towers, and has a fine cathedral and palace. Pop. 7657. Its chief trade is in spun-silk, wool, hemp, and coarse cotton textures.

**MONTAGNARDS**, or simply Montagne, "the Mountain," the name given to the extreme democratic politicians in the first French Revolution, because they seated themselves on the higher benches of the hall in which the *National Convention* met. Their principal members were Danton, Marat, Robespierre, St Just, and Collot d'Herbois, the men who introduced "the Reign of Terror." The opposite party of the "Plain" (*Plaine*) were the Girondists (q. v.), who sat on the lowest benches on the floor of the house. After the overthrow of the Girondists, this part of the house was styled the "marsh or swamp" (*marais*), and included all the subservient members whose votes were under the control of "the Mountain." A few leading men gave all its strength and formidable character to the party of the Mountain.—After 1848, the extreme party in the *National Assembly*, composed of revolutionary democrats and communists, sometimes flattered itself with the designation of "the Mountain;" but events proved that it possessed nothing of the genius, though it shewed all the malignity of its predecessor.

**MONTAGU**, Family of. This noble family are said, by Burke, to derive their name, which in Latin was and is always written De Monte Acuto, from a place in Normandy; and the first of the Montagus who settled in England was a warrior who came over in the train of Robert Earl of Moreton at the Conquest. Five centuries later, we find his descendant, Sir Edward Montagu, Lord Chief-justice, in succession, of the courts of King's Bench and Common Pleas under Henry VIII., who also appointed him one of the executors of his will and guardians of his son Edward. His grandson, who was a distinguished orator, represented the city of London in parliament; and having been Lord Chief-justice of the Court of King's Bench, and Lord Treasurer of the kingdom, was raised to the peerage as Earl of Manchester. The second earl gained distinction as a general in the Parliamentary army, and more particularly by his victory over Prince Rupert at Marston Moor; but he scrupled to take part in the condemnation and execution of Charles, and was one of the first members of the House of Peers who gave in his adhesion to Charles II. on his restoration. This nobleman's grandson enthusiastically espoused the cause of William III., under whom he fought at the battle of the Boyne, and took part in the siege of Limerick. He was subsequently sent as ambassador to Venice, and to the courts of France and Vienna, and eventually was raised to the dukedom of Manchester by George I. The title is still enjoyed by his descendant, the 7th duke. Other branches of the M. family were ennobled in the persons of the Earl of Sandwich, the Earl of Halifax, and the Duke of Montagu, but the last two titles both became extinct before the close of the 18th century.



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**MONTAGU, Lady Mary Wortley**, was eldest daughter of Evelyn, Earl, and afterwards (1715) Duke of Kingston. She was born about 1690, and is said to have received a classical education. When only eight years of age, she was introduced by her father to the famous *Kit-Cat Club*, and formally admitted a member. Her fond and pleasure-loving father allowed her to educate herself. She is even said to have taught herself Latin. She became attached to Mr E. Wortley Montagu, a member of the House of Commons, whose cousin, Charles Montagu, was created Earl of Halifax, and appointed First Lord of the Treasury, by George I. As the match was disapproved of by the families, she was obliged to elope before she could marry him. On the accession of George I., she came to London with her husband, who was a Whig. Lady Mary's beauty and wit attracted universal admiration at court. She was in habits of familiar acquaintance with Addison and Pope, the latter becoming her enthusiastic admirer, and writing "flames and raptures" for her, until his passion "came to a climax in an impertinence, and was extinguished by a box on the ear, or some such rebuff." In 1716, Mr Wortley Montagu was appointed ambassador to Constantinople. He was accompanied by Lady Mary, who, on her journey, and during her residence in the Levant, wrote the well-known "Letters," which form one of the most delightful books in our language. The weaknesses of a somewhat vain and capricious temper fade into forgetfulness, when we remember the strong sense, enlightened courage, and generous perseverance which introduced into Europe the practice of inoculation, which she witnessed in Turkey. She had so much faith in its safety, that she tried it at first on her own son. See **INOCULATION**. After her return to England, she fixed her residence at Twickenham, and renewed her intimacy with Pope. But political soon led to personal differences, and these resulted in one of the most famous literary feuds of the 18th century. The immediate occasion of it was the publication by Lady Mary of her "Town Eclogues." She was fiercely assailed by both Swift and Pope, and was not slow to retaliate. In 1737, she left her country and her husband (for reasons that are not known), and lived for many years in Italy, chiefly at Lovers, in the province of Venice. Her husband died in 1761. At the request of her daughter, afterwards wife of the Earl of Bute, she returned to England, where she died 21st August 1762. A collected edition of her works, with life, was published by her great-grandson, the late Lord Wharfedale, in 1836, of which a third edition appeared in 1861.

**MONTAIGNE, Michel Eyquem de**, a distinguished French moral philosopher, was born in 1533, at his paternal home of Montaigne, in Perigord. In accordance with his father's eccentric ideas on education, he was taught, and suffered only to speak Latin from his earliest infancy, in consequence of which he acquired such a perfect mastery over the language, that when, in his tenth year, he entered the college of Bordeaux, his masters, Granchi, Buchanan, and Murer, were almost afraid to address him. On the expiration of his course of studies, which were directed to law, he received, in 1554, the appointment of councillor in the parliament of Bordeaux; but being possessed of ample means, and having no inclination for a public life, he devoted himself to the study of the various schools of Greek and Roman philosophy; and on the death of his father, in compliance with whose wish he had made a translation of the natural theology of Raymundus Seboudas (Paris, 1569), he retired to his ancestral estate, where he lived in retirement during the terrible season of religious oppression which desolated France for so many years. During this period, 1580, he composed the first two books of his celebrated "Essays," the third portion of which appeared in 1588, after his return from an extensive course of travels, which he had undertaken partly for escape from the plague, and partly for the improvement of his own health, and during which he visited Rome, and was received with signal favor by the pope. M.'s "Essays," although not conceived in the spirit of a believing Christian, or marked by the reticence and delicacy of expression which modern refinement demands, are very extraordinary productions, not only for the learning and sound reasoning which they manifest, but also for the frank and liberal tone in which social questions are discussed, notwithstanding that the author wrote at a period when religious differences and party feelings blinded the judgments of men. M.'s ethics were those of Seneca and the other philosophers of ancient times, whose works he had so thoroughly mastered; and, judged from our point of view, his morality is that of a virtuous pagan merely; but when we bear in mind the turmoil of civil war, and the

consequent disorganisation of society, together with the low ebb of literature in France at that period, we must do justice to the great merit of the writer, and the influences for good which his writings exerted. M. was a constant, and occasionally a successful, mediator between the party of Henry of Navarre and that of the Guises, and stood in relations of friendship with men of all creeds. He died in 1592, as an avowed member of the Church of Rome, in whose doctrines he professed implicit faith, notwithstanding the sceptical bias which he had through life been at no pains to conceal. Numerous editions have appeared of his "Essais," among which we may instance those of De Coste (5 vols. Hag. 1727), and Victor Leclerc (Paris, 1826). Nearly 200 years after his death, the discovery was made at Montaigne of the MS. of his travels, which was published at Paris in 1774, under the title of "Journal de Voyage de M. de M. en Italie par la Suisse et l'Allemagne." Translations of the "Essais" exist in almost all the European languages; the best English translation is that by Cotton. The best biographies of M. are by Grûn (Paris, 1855); Payen (Paris, 1856); and Bayle St John (Lond. 1857).

**MONTALCINO**, a town in the province of Siena, Central Italy, 22 miles south-south-east of the town of Siena, stands on a hill in the midst of valleys, and enjoys a fine equable climate. Pop. 7540. The wine of M. is in high repute throughout Tuscany.

**MONTALEMBERT**, Charles Forbes, Comte de, was born in April 1810 of an ancient family of Poitou. His father was created a peer of France under the Restoration, and for a considerable time was minister of the French court in Sweden. His mother was of the Scottish family of Forbes, to which circumstance may be ascribed M.'s remarkable familiarity with the English language, and his intimate knowledge and strong admiration of the social and political institutions of England. Although his more advanced studies were carried on in the university of Paris, a considerable part of his youth was spent in Sweden; and the first work by which he was brought into notice, was a pamphlet on Sweden, which he published in his nineteenth year. On the death of his father, M. succeeded to his honors, and to his seat in the Chamber of Peers. But his earliest public appearance was in what may be truly considered as the great labor of his life, a joint effort in which he associated himself with the Abbé Lacordaire (q. v.) and other friends, for the purpose of taking advantage of the recent charter, by establishing a free school for Catholic education, independent, as well of the university, as of all other state influence. An attempt on the part of the police to interfere arbitrarily with this project, became the subject of a trial before the Chamber of Peers, which M. rendered memorable by his first speech, one of the most brilliant upon record, and a clear foreshadowing, not alone of the eloquence, but of the bold and uncompromising earnestness in the cause of his church and of the common interests of religious liberty, which have constantly characterised his later career. Of the struggle of the Catholic party in France against what they regarded as the arbitrary monopoly of education which was claimed for the university, M. was for many years the leader and the champion; and in the various works in the preparation of which he employed all his leisure from public duties, his "Life of St Elizabeth of Hungary," his "Life and Times of St Anselm," and, above all, in an appeal "On the Duty of Catholics on the Question of Freedom of Education," which he wrote during a visit to the island of Madeira for the recovery of his health in 1843, he never ceased to advocate the same principles. After the revolution of 1848, M., true to his former professions, was one of the first of his party to accept of the new state of things, and to see the actual means at his disposal for the furtherance of the views which he had consistently advocated. He was elected member of the National, and afterwards of the Legislative Assembly; and for a time contrived, while he continued the same line of policy as regards church interests, to give a general support to the government of Louis Napoleon as president of the republic. His first break with that government was on the question of the proposed confiscation of the Orleans property; and after the *coup d'état* of December, the breach became irreconcilable. From that time, M. continued to be the implacable assailant of the arbitrary repression of public opinion which characterised some measures of Napoleon III.; and the brilliant and enthusiastically admiring pictures, which in his "Political Future of England," he has drawn of its social and

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political institutions, derive much of their vigor from the covert but palpable contrast with the condition of France which points them all. Besides numerous articles contributed by him to the "*Revue des Deux-Mondes*," the "*Encyclopédie Catholique*," and the "*Correspondant*," he also wrote: "*L'Avenir politique de l'Angleterre*" (1855); "*Les Moines d'Occident depuis St Benoît jusqu'à St Bernard*" (1860—1867; English translation, 5 vols. 1861—1867); "*Une Nation en deuil, la Pologne en 1861*"; "*L'Eglise libre dans l'Etat libre*" (1863); "*Le Pape et la Pologne*" (1864), &c. He died 13th March 1870. See Memoir by Mrs Oliphant, 2 vols. (1872).

MONTANA, a territory of the United States, formed in 1864, extending from lat. 45° to 49° n., and long. 104° to 116° w. It is mostly to the east of the Rocky Mountains, and is bounded, n. by British America, w. by Washington and Idaho, s. by Wyoming, e. by Dakota. Its average length is 470 miles, its average breadth 275 miles, and its area 143,776 sq. miles, or 92,016,640 acres, of which, in 1870, 84,674 were under cultivation. M. has great mineral wealth, not yet fully taken advantage of, including gold, silver, galena, copper, coal, and precious stones. Its yield of bullion in 1866 was valued at \$16,500,000; in 1874, \$4,000,000. It is exceedingly well watered, the chief rivers being the Missouri and Yellowstone, with their affluents, and the Columbia. M. is well adapted for grazing. Pop. (1880) 39,159, besides 22,496 tribal Indians.

MONTANUS, a celebrated heresiarch of the early Christian Church, was a Phrygian by birth, and made his first public appearance about 160 A.D., in the village of Ardabur, on the confines of Phrygia and Mysia. He was brought up in heathenism, but embraced Christianity with all the fanatical enthusiasm for which his countrymen were noted.

M.'s stand-point was, *in theory*, the exact opposite of that occupied by the Gnostic sects; yet, *in practice*, it led to a similar exclusiveness and sectarianism. He believed in the constancy of supernatural phenomena *within* the church. The miraculous element, particularly the prophetic ecstasy, was not removed; on the contrary, the necessity for it was greater than ever. He considered those only to be true or perfect Christians who possessed the inward prophetic illumination of the Holy Spirit—they were the true church; and the more highly gifted were to be looked upon as the genuine successors of the apostles, in preference to the mere outwardly consecrated bishops. Thus, they formed a religious aristocracy, as arrogant as the Gnostics; the difference between the two simply being, that the Montanists prided themselves on a kind of inflamed inspiration, and the Gnostics on a calm and serene illumination of the reason. Neither party wished to recede from the Catholic Church, but rather to exist as an esoteric body within its pale. It was persecution, caused, no doubt, by their own insolent obstinacy, that forced them into a sectarian course. M. did not meddle directly with the creed of the church; in fact, he was not a thinker, nor a man of almost any importance intellectually. His efforts were confined to stirring up the Christians generally to fresh religious life—to a belief in a fresh outpouring of the Holy Ghost! At first, M. contented himself with predicting fresh persecutions, exhorting men to greater strictness and holiness of life, and announcing judgments to come upon the persecutors; but his idea of his own mission afterwards became more exalted, and he claimed to be in a very special sense a prophet of God—the organ chosen by the Holy Ghost to purify, enlighten, and advance the church. Among the things on which the Montanists laid stress, was an ascetic mode of life, scorn of persecution, and love of martyrdom; connected with these, and, indeed, flowing from them, was an aversion to second marriages, and to the restoration of the LARSEN (q. v.). Like other enthusiasts, they also were firm believers in the near approach of the Millennium (q. v.), and in the personal advent of Christ. Two "prophetesses," Priscilla and Maximilla, were associated with M. in his work. A decree for the expulsion of M. and his followers from the communion of the Catholic Church was issued by Eleutherus, Bishop of Rome. The Montanists at once proceeded to organise themselves as a distinct sect. They found a singularly able apologist in Tertullian (who became a Montanist about 200 A.D.), and continued to exist till the 6th century.

MONTARGIS, a town of France, department of Loiret, is situated at the junction of the canals of Orleans and Briare with that of Loing, 40 miles east-north-east

of the city of Orleans. M. has some cloth and leather manufactures, and considerable trade in corn, cattle, &c. Pop. (1876) 9175. In its vicinity is an extensive forest of the same name.

**MONTAUBAN** (Lat. *Mons Albanus*), a town of France, capital of the department of Tarn-et-Garonne, is situated in a rich and beautiful country on a plateau between the rivers Tarn and Tescou, 52 miles north of Toulouse. It is the seat of a bishop, has a fine cathedral in the Italian style, finished in 1739, built on the site of a still older monastery, the *Mons Aureolus* (Golden Hill), and is a well-built, handsome town. The houses are mostly of brick. Besides having considerable manufactures, it carries on a great trade in wine, grain, leather, &c. M. was founded in 1144 by Count Alphonse of Toulouse, became the seat of a bishop in 1317, embraced the Reformation in 1572, and suffered severely in the civil wars that ensued. It has acquired historical celebrity as the great stronghold of the Huguenots. Protestantism still exists here, and maintains both an academy and a theological college. Pop. (1876) 19,790, nearly one-half of whom are Protestants.

**MONTBELIARD** (Ger. *Mömpelgard*), a town of France, in the department of Doubs, 36 miles north-east of Besançon. It lies in a valley between the Vosges and Jura Mountains, is surrounded by an old château, now used as a prison, and carries on manufactures of cotton goods, hosiery, and silks. Clocks, watches, and agricultural implements are also made. Pop. (1876) 7625.

**MONT BLANC**, the highest mountain in Europe, and, according to the latest measurements, 15,781 feet above the level of the Mediterranean Sea, is one of the Graian Alps, and is situated in the department of Haute-Savoie, France, close to the Italian frontier, and 37 miles south of the east end of the Lake of Geneva. The *valles* of Chamouni and Mountjoie lie on the west, and those of Ferret and Allée Blanche on the east side of it. The waters which spring from its western slopes are drained off to the Arve, and thence to the Rhone, while those which rise on the east side are feeders of the Dora Baltea, a tributary of the Po. It has 3 snow-clad peaks, and 36 glaciers, of which 16 lie on the north, and 20 on the south side. The highest summit is a narrow ridge 50 yards by 16, called *La Bosse du Dromedaire*, covered with firm snow, and very steep towards the north. In 1760, Saussure offered a prize for the discovery of a practicable route to the summit of Mont B., which was gained, in June, 1786, by Jacques Balmat, a guide. Saussure himself ascended the mountain the following year; and the same feat has since been performed by many, especially since Albert Smith published the well-known pictorial and dramatic description of his ascent in 1851.

**MONTBRISON**, a town of France, capital of the dep. of Loire, 37 miles south-west of Lyon, on the Vizezy, a feeder of the Loire, stands at the base of a lofty and precipitous rock. In the vicinity are mineral springs. Pop. (1872) 5336.

**MONT CENIS.** See **CENIS**.

**MONT-DE-MARSAN**, a town of France, capital of the dep. of Landes, at the junction of two streams—the Midon and Donze—which, when united, take the name of Midouze, and join the Adour. It is 65 miles south of Bordeaux, with which and with other places it is connected by railway. The town has of late years made great progress. It has a communal college, and mineral warm baths. There are manufactures of common woollen cloths, blankets, sail-cloth, and leather. Pop. (1872) 6964.

**MONT DE PIÉTÉ**, called in Italy *Monte di Pietà*, a charitable institution, the object of which is to lend money to the very poor at a moderate rate of interest. It had its origin at the close of the mediæval period, when all such transactions were in the hands of usurers, to whom the necessities of the poor were but an inducement to the most oppressive extortion. The earliest of these charitable banks appears to have been that founded at Padua in 1491, which was so successful as to lead, according to contemporary writers, to the closing of the Jewish banks in that city. The first opened at Rome was under Leo. X.; and the Roman *Monti di Pietà* are confessed to have been at all times the most successful and the best managed in Italy. The institution extended to Florence, Milan, Naples, and other cities. The principle of all was to advance small sums on the security of pledges, but at a rate of interest barely sufficient to cover the working expenses. Should any surplus remain, it was to be expended for charitable purposes. The *Mont de Piété* system was introduced

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also in Spain, France, Belgium, Germany, and the Netherlands. In 1873, there were in France 46 *Monts de Piété*, making yearly loans of 60,000 francs. It formed the model of the Loan Fund Board of Ireland, established by 6 and 7 Vict. c. 91. See PAWN-BROKING.

**MONTEBELLO CASTEGGIO**, a village of Northern Italy, in the province of Pavia, 23 miles east-north-east of Alessandria. It stands in a plain on the banks of the torrent Schizzola. Here the Austrians were defeated by a French army under General Lannes, after a desperate conflict, 9th June 1800. The title of Duke of Montebello was conferred on the victorious French general five years later. It May 1859 the Austrians were again defeated here by the united armies of the French and Piedmontese. See CASTEGGIO.

**MONTE-CASINO**. See CASINO, MONTE.

**MONTE-CATINI**, a village of Tuscany, situated on a spur of the Apennines, 29 miles west of Florence, derives its name from the bowl-shaped hill on which it stands. It is of very ancient origin, and was formerly called *Castello*. In the close vicinity of the town are the famous mineral springs of same name, in high repute for their curative properties, especially in diseases of the liver and digestion. Excellent accommodation can be had by visitors both in private establishments and those under government direction.

**MONTE CHIA'RO**, a town of Northern Italy, in the province of Brescia, situated on a height on the left bank of the Chiese, in the centre of an amphitheatre of hills. Pop. 6933. The chief manufacture is silk. In 1796, the Austrians were defeated here by a French army.

**MONTE CHRISTO**, a small island, belonging to Italy, 26 miles south of Elba. It consists of a mountain of granite 1933 feet above the level of the sea, and is uninhabited except by wild goats and other animals. It is inaccessible except by one narrow landing-place. M. C. has given name to Dumas's well-known novel.

**MONTECUCULLI**, Raimondo, Count, born near Modena, 1608, and entered the Austrian artillery as a volunteer under his uncle, Ernesto, Count Montecucull, in 1627. During the Thirty Years' War he found many opportunities of distinguishing himself, received rapid promotion, and was employed in various services, military and diplomatic. In 1657, he was sent to support the king of Poland, John Casimir, against the Swedes and Rákóczy, which he did with great effect, compelling Rákóczy to make peace with Poland, and to break his alliance with the Swedes. In the following year, he was made a field-marshal, and was sent to aid the Danes against the Swedes, in which also he was eminently successful. In 1660, he commanded the army sent to oppose the Turks, who had broken into Transylvania, and skilfully kept them in check till the arrival of the French, with whose assistance he won the great battle of St Gotthard, on the banks of the Raab, 1st August 1664—the first decided triumph of European tactics and discipline over the mere numbers and daring of the Ottoman hosts. When the war broke out between France and Holland, in which the emperor took part with Holland, M. received the command of the imperial army in 1672. He took Bonn, and notwithstanding the endeavors of Turenne to prevent it, effected a junction with the Prince of Orange. In 1675, he was opposed to Turenne on the Rhine, and they spent four months in manœuvres in which neither could gain any advantage. After this campaign, M. spent the remainder of his days at the imperial court and in the society of learned men. He was himself a man of learning and various accomplishments, and has left works on the art of war, on the Turkish war, and on the war of 1664, and also sonnets. The Emperor Leopold made him a prince of the empire, and the king of Naples bestowed on him the duchy of Mold. He lost his life by the fall of a beam as he was entering Linz with the imperial court, 16th October 1681. His writings were published in the original Italian by Ugo Foscolo (2 vols. Milan, 1807); and by J. Grassi (2 vols. Turin, 1821). A semi-autobiographic memoir was translated into Latin, and published at Vienna, under the title of "*Commentarii Bellici*," in 1718.

**MONTEGO BAY**, a small but flourishing seaport on the north coast of the island of Jamaica, 17 miles west of Falmouth. It has a harbor protected by a break-water, is defended by a battery, and carries on a general trade of some import-

ance. More than 100 vessels annually enter and clear the port. Population variously stated at from 4000 to 5000.

**MONTÉLINAR**, an ancient town of France, in the department of Drome, about two miles from the left bank of the Rhone, and twenty-six miles south of Valence. It stands on the slope of a hill covered with vineyards. There are factories for silk and cotton goods; tanneries, &c. Pop. (1872) 7787.

**MONTÉM CUSTOM**, was a triennial procession of the Eton boys, on Whit-Tuesday, to a certain mound (*ad Montem*) known as the Salt Hill, near the Bath Road, and which was doubtless so called because certain of the boys levied tribute (for salt, as the phrase went) from every person present, and even from any chance passer. These juvenile tax-gatherers were attired in fancy dresses of silk. The king and queen, besides many members of the nobility, frequently honored the procession with their presence; and on such occasions, as much as £1000 has been collected, which was given to the senior scholar to support him at Cambridge. The origin of the custom is unknown. It was discontinued in 1847.

**MONTENEGRO** (an Italian translation of the native name **CZERNAGORA**, "Black Mountain") is a small but independent and recently extended principality situated between Bosnia and Albania. Till 1878 it was separated from the Adriatic by a narrow strip; now it touches the coast for a short distance at Antivari, its only port, which is closed to the navies of all nations—M. being prohibited from having war-ships. M. contains above 2000 square miles, and is everywhere mountainous, the mountains being in most cases clothed with dark forests of fir, ash, beech, oak, hick, willow, and poplar. Mt Dormitor, in the north, is 8200 feet, and Mt Kom, in the east, 8000 feet above sea-level. Agriculture is prosecuted to the utmost extent the country will admit of, but in a rude and primitive manner. The products are those of other European countries in the same latitude. Few oxen are reared, but sheep, goats, and swine abound.

There are no towns in M. save in the recently conceded portion: of them, Podgoritz, (pop. 7500) and Antivari (pop. 3900) are the only ones worthy of mention. Cetigne or Cetinji, the seat of government, contains above a hundred houses, many of them well-built, besides a convent and the palace of the Prince of Montenegro. The villages are unwall'd; the houses, or rather huts, which compose them, are rarely provided with chimneys, and in the elevated districts are more wretched in appearance than even the mud hovels of Ireland.

The Montenegrins or Tzernagorzes are Slavs of the Servian race, and number about 150,000. They are knit together in clans and families, and have many feuds amongst themselves, which are perpetuated by the hereditary obligation of avenging blood. Their chief occupations at home are agriculture and fishing, but they are ever ready for war or pillage. Education among them is at a very low ebb; in fact, it is held in contempt, and many, even among the priests, are unable to read or write. In 1841, several schools were established, and the art of printing introduced; but the unsettled state of the country has hitherto prevented much improvement. Their language is a very pure dialect of the Slavic. They belong to the non-united Greek Church. In 1871 the first newspaper in M. was established.

**Political Divisions and Government.**—M. is divided into the districts of M. Proper, and Brda or Zjeta, each of these being subdivided into four "nahies" or departments, and these are further subdivided, each subdivision having its own hereditary chief. Besides, there are the newly added territories, not yet organized. Until 1851, the head of the government was the *Vladika* ("metropolitan," or "spiritual chief"), who, besides his proper office of archbishop and ecclesiastical superior, was at the same time chief ruler, lawgiver, judge, and military leader. This theocratic administration became (1697) hereditary in the Petrovitch family, but as the vladika cannot marry, the dignity was inherited through brothers and nephews. Since 1851, the two offices have been disjoined, and the vladika is restricted to his ecclesiastical office, while the cares of government devolve upon the "Gospodar" ("hospodar") or lord, though the common people still apply to him the title "sveti gospodar," which properly belongs to the vladika alone. The vladika Pietro II. (1830—1851) established a senate of twelve members, elected from the chief families of the country, and in this body the executive power was vested. Next to the vladika in eccle-

sinal affairs is the archimandrite of the convent of Ostroc. The other public officers, as the Secretary of State, the Chancellor, and the local judges, are appointed by popular election. From time to time, an *Assembly* of all the adult males of the country takes place in a grassy hollow near Cettigne, the capital; but the powers of this assembly are very undefined. For defraying the expenses of government, taxes are levied on each household, the income thus raised amounting to 40,000 Austrian florins, or £4068. Besides this, the prince receives from Russia a subsidy of 8000 ducats (£3733), and from Austria one of 20,000 florins (£2000). As the Montenegrins, even when engaged in agricultural operations, is always armed with rifle, yataghan, and pistols, an army of 26,000 men can be summoned on the shortest notice, and in desperate cases, 14,000 more troops can be raised. Their intense love of independence, and heroism in the defence of their country, is worthy of the highest respect; but out of their own country, they are savage barbarians, who destroy with fire and sword everything they cannot carry off.

There is little trade in M., yet hides, wool, venison, dried and smoked fish, mutton and goat flesh, bacon, lard, &c., are exported in considerable quantities. These goods are carried to Cattaro by the women, aided occasionally by mules, for, owing to the absence of roads (a precaution against invasion), carts are unknown. Austrian and Turkish coins form the currency, as M. has no mint of its own.

*History.*—M. belonged in the middle ages to the great Servian kingdom, but after the dismemberment of the latter, and its conquest by the Turks at the battle of Kossovo (1389), the Montenegrins, under their prince, who was of the royal blood of Servia, maintained their independence, though compelled to relinquish the level tracts about Scutari, with their chief fortress of Zabllak, and confine themselves to the mountains (1495). In 1516, their last secular prince resigned his office, and transferred the government to the vladika. The Porte continued to assert its claim to M., and included it in the pashalik of Scutari; but the country was not conquered till 1714, and on the withdrawal of the Turks soon afterwards, it resumed its independence. In 1710, they had sought and obtained the protection of Russia, the czar agreeing to grant an annual subsidy on condition of their harassing the Turks by incursions, and this compact has, down to the present time, been faithfully observed by both parties. Another part of the agreement was, that the archbishop or vladika was to be consecrated by the czar. In 1796, the Prince-bishop, Pietro I., defeated the Pasha of Scutari, who had invaded M., with the loss of 30,000 men; and for the next quarter-century we hear no more of Turkish invasions. The Montenegrins rendered important aid to Russia in 1808 against the French in Dalmatia, and took a prominent part in the attack on Ragusa, the capture of Curzola, and other achievements. Pietro II., who ruled from 1830 to 1851, made great efforts to civilise his people, and improve their condition. He established the senate, introduced schools, and endeavored, though unsuccessfully, to put an end to internal feuds, and predatory expeditions into the neighboring provinces. Some Turkish districts having joined M., the Turks attacked the latter in 1832, but were repulsed. A dispute with Austria regarding the boundary resulted in a war, which was terminated by treaty in 1840. In 1851, the last prince-bishop died, and his successor, Danilo I., separated the religions from the secular supremacy, retaining the latter under the title of Gospodar. This step caused the Czar Nicholas to withdraw his subsidy (which was relieved, and the arrears paid, by the Czar Alexander II.), and the imposition of taxes thus rendered necessary, caused great confusion. This was taken advantage of by the Turks, who, under Omar Pasha, invaded the country; but the intervention of the Great Powers compelled a treaty, February 15, 1853. Danilo went in vain to the Paris conference in 1857, seeking the recognition of M. as independent. In 1860, the Montenegrins excited an insurrection against the Turkish rule in the Herzegovina, which was soon suppressed, and in return they were so hard pressed by the Turks, that they were glad to agree to a treaty (1863), by which the sovereignty of the Sublime Porte over M. was recognised. Fresh complications caused M. to declare war against Turkey in Jan. 1876, but a compromise was effected. M., however, supported the insurrection against Turkey that broke out in the Herzegovina a little later, and in July 1878 was again at war. The Montenegrins co-operated with the Russians against their hereditary enemy during the war of 1877—1878; and the Berlin Conference (1878) recognised the independence of M., and agreed to an important extension of Montenegrin territory.

**MONTENO'TTE**, a small village of Northern Italy, 26 miles west of Genoa, where the Austrians were defeated by the French on the 12th April 1796.

**MONTEPULCIA'NO**, a city of Italy in the province of Siena, situated on a high hill, 56 miles south-south-east of Florence. Pop. about 3000. Numerous Etruscan remains have been excavated in the neighborhood. The wines of M. are famous.

**MONTETERA'LE**, a town of S. Italy, in the province, and 14 m. n.w. of the town of Aquila. Pop. 5014. It stands on a hill in the midst of a vast plain, and has several elegant churches. There are vast chestnut-groves near M., which furnish the poor inhabitants with the chief article of their subsistence.

**MONTEREAU**, a town of France, in the department of Seine-et-Marne, at the confluence of the Seine and Yonne, 46 miles south-east of Paris, with which there is communications by steam-boat. The manufactures are earthenware and leather. Here, in 1419, Jean-sans-Peur, Duke of Burgundy, was assassinated, at the instigation and in the presence of the Dauphin, afterwards Charles VII.; and in the immediate vicinity, Napoleon, Feb. 18, 1814, gained his last victory over the allies. Pop. (1876) 6847.

**MONTREY'**, the most thriving city of Northern Mexico, capital of the state of Nuevo Leon, on the San Juan, a tributary of the Rio Grande, 175 miles west of Matamoros. It is well paved and clean, stands on a broad plain, 1626 feet above sea-level, and is surrounded by beautiful gardens and orchards. Pop. in 1869, 13,509. From its situation, its facilities for commerce are great; and it is the entrepôt for the transport of American goods from the Rio Grande to the inland states of Durango and Zacatecas. In the war between the United States and Mexico, M. capitulated, 24th September 1846, after a siege of four days, to the American forces under General Taylor.

**MONTE RO'SA**, the *Mons Sylvius* of the ancients, is the highest mountain in Europe after Mont Blanc. It is situated in the angle where the west end of the Pinnine meets the Lepontic Alps, and separates the canton of Valais from Italy. The northern portion of the mountain is highest, and forms nine peaks, the highest of which is forked and precipitous, and attains an altitude of 15,210 feet above sea-level. Many attempts were made to ascend this peak, but none were successful till 1855. The mountain appears to consist of mica-slate, in some places alternating with gneiss. It is rich in metallic ores, and several mines of gold, copper, and iron are worked. The highest mine is between 10,000 and 11,000 feet above sea-level, and in the region of perpetual snow. Rye ripens up to an elevation of 6000 feet; and the vine is found as far up as 8200 feet; but there is a difference of nearly 1000 feet in the altitude of the corresponding vegetation on the north and south side.

**MONTE SANT' ANGELO**, a city of Southern Italy, in the province of Foggia (formerly Capitanata), 28 miles north-east of Foggia. It stands on one of the Gargano group of hills, at a height of 2790 feet, and has numerous fine churches. It is famed for its exquisite honey, gathered from the odoriferous alpine plants of the mountain. Pop. 14,936.

**MONTE SAN GIULIA'NO**, a town of the island of Sicily, province of Trapani, situated on a high mountain 4 miles east-north-east of the town of Trapani. On the mountain (anciently *Eryx*) are the remains of a once famous temple of Venus. Pop. 6250.

**MONTE SA' RCHIO**, a town of Southern Italy, in the province of Benevento, 13 miles north-west of Avellino, on the torrent Corro. Pop. 5600.

**MONTESQUIEU**, Charles de Secondat, Baron de la Brède et de, one of the most celebrated authors and political philosophers of France, born 18th January, 1689, at his father's château of Brède, near Bordeaux, and descended from one of the most distinguished families of Guienne. In his youth he was a hard student of jurisprudence, literature, and philosophy. His love of the classical authors was so great, that at the age of twenty he composed a work intended to shew that they did not deserve eternal damnation for being pagans. In 1714, he was appointed a councillor of the parliament of Bordeaux, and two years after, president of the parliament. His first (published) work was his famous "*Lettres Persanes*" (Par. 1721), in which,



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in the character of a Persian, he ridicules, with exquisite humor, and clear, sharp criticism, the religious, political, social, and literary life of his countrymen. Although he did not spare the Academy in these "Lettres," he was admitted a member of it in 1728, and would have been admitted sooner, if Cardinal Fleury had not objected on the ground of his jests against religion. In 1726 M. resigned his office in the parliament of Bordeaux, and spent some years in foreign countries. In England, he spent two years, during which he was much in the company of Lord Chesterfield, and was treated with the greatest respect by the most distinguished personages. After his return to Brède, he published his "Considérations sur les Causes de la Grandeur et de la Décadence des Romains" (Par. 1734), a masterly view of Roman history, expressed in a sententious, oracular, and vigorous style. It was followed, after a long interval, by his "Dialogues de Sylla et de Lysimaque" (Par. 1748), published under an assumed name, in which the motives and feelings of a despot are skilfully analysed. In the same year appeared his great work, on which he had been engaged for twenty years, the "Esprit des Loix" (2 vols. Geneva, 1748), in which it was attempted to exhibit the relation between the laws of different countries and their local and social circumstances. It was immensely popular. No fewer than twenty-two editions were published in eighteen months, and it was translated into various European languages. The "Esprit des Loix" is a wonderfully good book, considering the age in which it appeared. Without adopting Voltaire's hyperculegistic criticism, that "when the human race had lost their charters, Montesquieu rediscovered and restored them," it may be said that it was the first work in which the questions of civil liberty were ever treated in an enlightened and systematic manner, and to M., more than to any other man, is it owing that the science of politics has become a favorite subject of study with the educated public. M. died at Paris, 10th February 1755. The collective editions of his works are numerous, among which many be mentioned the complete and careful ones by Anger (8 vols. Par. 1819), by Destutt de Tracy and Villemain (8 vols. Par. 1827), by Lefebvre (2 vols. Par. 1839), and by Hachette (2 vols. 1865).

**MONTE VIDEO**, San Felipe de, the capital of the republic of Uruguay, in South America, is situated on the north shore of the estuary of the Rio de la Plata (which is here 60 miles wide), and 132 miles east-by-south from Buenos Ayres. It stands on a small peninsula, and is surrounded by a wall and fortifications. The houses are mostly of one story, with flat roofs. The only public buildings worthy of notice are the cathedral and the town-hall. The climate is healthy; but, as there are no rivers near the town, water is scarce, and it is only obtainable from wells, or by collecting rain-water in cisterns. The bay or harbor, which is about  $3\frac{1}{2}$  miles long by 2 broad, presents excellent facilities for building wharfs, docks, &c., is sheltered from all but the south-west gales, and averages 16 or 17 feet in depth. The trade of M. V. is extensive; the exports consisting of wool, hides, hair, tallow, salt and dried beef, bones, &c.; and the imports, of cotton and woollen fabrics, hardware, also flour, wine, spirits, and other provisions. The chief trade is with Great Britain. M. V. has steam communication with the United States, Rio Janeiro, Britain, and Genoa, and besides these, carries on a considerable trade with France, Spain, La Plata, and Italy. The population in 1862 (inclusive of the small suburbs of Cordon and Aguada) was 45,765; and in 1872, 105,296. In 1871, 1502 vessels, of 739,607 tons, entered and cleared from the port. The imports for 1875 amounted to about £3,300,000; and the exports to about £3,000,000. For the history of M. V., see URUGUAY.

**MONTEZUMA**, the name of two of the emperors of Mexico.—M. I., the most able of the Mexican emperors, ascended the throne about 1487, and soon after, commenced a war with the neighboring monarch of Chalco, which resulted in the annexation of that kingdom to Mexico. Tlatelolco, Cuixtlan, and Tzompahuacan were next annexed. Some reverses which his arms now suffered, led to a confederacy of the Tlascalans and two other powerful tribes against him; but in the war which followed, M.'s arms were again signally triumphant, and the territories of the conquered tribes increased the domain of the now all-powerful Montezuma. After several other successful wars, he died in 1471.—M. II., the last of the Mexican emperors, before its subjugation by the Spaniards, succeeded to the throne in 1502. He had distinguished himself as a warrior during the reign of his predecessor, and after his accession, carried the terror of his arms to the frontiers of Nicaragua and

Honduras. He was at the same time a member of the priestly order, and did not demit his functions on his accession. He devoted his chief attention to the improvement of the laws, and of the internal administration, and displayed his taste for pomp and luxury by the magnificence of his household arrangements, and a profuse embellishment of his capital. This necessitated heavy taxation, which, combined with the strictness of his administration, led to continual revolts among his subjects, especially those who had lately come under his sway. When Cortes landed in Mexico with his small army in 1519, M., blinded by an old prophecy, and by the strange appearance of the invaders, acknowledged them as beings of a superior order, and as his masters (see CORTES). The inhabitants of Mexico having risen against Cortes, the latter caused M., who was then his prisoner, to appear in order to pacify them; but being wounded accidentally by a stone flung from amongst the crowd of his own subjects, he so keenly felt the indignities which he had suffered, that he repeatedly tore the dressing from his wound, and soon after died, June 30, 1520. Some of his children adopted the Christian religion, and his eldest son received from Charles V. the title of Count of Montezuma. One of his descendants was viceroy of Mexico from 1697 to 1701. His last descendant, Don Marillio de Teruel, Count of Montezuma, was banished from Spain by Ferdinand VII., and afterwards from Mexico, on account of his liberal opinions, and died at New Orleans in 1836.

**MONTFERRAT**, formerly an independent duchy of Italy, between Piedmont, Milan, and Genoa, now forming part of the kingdom of Italy. It consisted of two separate portions, Casale and Acqui, lying between the Maritime Alps and the Po, and having an area of over 1800 square miles. The capital was Casale. M., after the downfall of the Frankish empire, was ruled by its own margraves till the beginning of the 14th century. This illustrious house for a long time disputed the sovereignty of Piedmont with the House of Savoy, and sent to the crusades more heroes than any other sovereign house in Europe. Members of the family ruled simultaneously in M., Thessaly, and Jerusalem. On the death of the Marquis John I. in 1205, his sister, Iolande or Irene, who was Empress of Constantinople, succeeded to M.; and her second son became the founder of the family of Montferrat-Palaeologus, which became extinct in 1533, and M. passed to the Gonzagas of Mantua. In 1631, the dukes of Savoy obtained possession of a portion of M., and in 1703, with the consent of the German Emperor, the remaining portion passed under their sway, and was incorporated with their own dominions.

**MONTFORT**, the name of a noble French house, descended, according to the most probable opinion, from Baldwin, Count of Flanders, and Judith, daughter of Charles the Bald. AMAURI 2d, Seigneur de Montfort (a little town between Paris and Chartres) is the first of the family mentioned in history. He lived in the first half of the 11th century. His son, SIMON 1st, had for his third wife Agnes, daughter of Richard Comte d'Evreux. He left four sons, of whom only AMAURI 4th had issue. The grandson of this Amauri, SIMON 3d, surnamed the *Bald*, Comte de Montfort and Evreux, married Amicie, daughter of Robert de Beaumont, Earl of Leicester. His second son was the famous SIMON 4th, Comte de Montfort, and Earl of Leicester, subsequently Comte de Toulouse. This nobleman, so conspicuous in the terrible crusade against the Albigenses (q. v.), was born about the year 1150. In 1193 he went to Palestine at the head of a troop of French knights, but failed in doing anything against the Saracens, and was obliged to return. In 1209 he joined the 4th crusade, which, however, had no religious design at all (see CRUSADES), in consequence of which M. abandoned it. In 1209 he took part in the war of extermination against the Albigenses. He signalled himself by his relentless ferocity, and his brilliant successes, but was killed by a stone at the siege of Toulouse, 25th June 1218.

**MONTFORT**, Simon de, Earl of Leicester, the fourth son of the preceding, was born in France about 1206. The title of Earl of Leicester came to him by his grandmother, Amicie de Beaumont, sister and heiress of Robert Earl of Leicester, but he did not directly or immediately inherit it, for, during the reign of King John, it was borne by Ranulf, Earl of Chester. Some time after the death of Ranulf, M. came to England, and offered his services to Henry III. Already he enjoyed a great reputation as a warrior, and Henry was so highly pleased with the young French noble,

that he conferred on him the title of Earl of Leicester. Little did Henry think that the stranger was to prove against himself a great founder and champion of English constitutional liberty. He married Elinor, sister to King Henry III., and the youthful widow of that Earl of Pembroke to whom, more than to any other, the people of England owe Magna Charta. After this marriage—which was viewed with disfavor by the king—De M. became a steadfast advocate of the English Charter, and of the liberties of the people. After visiting the East, he was sent by the king to undertake the command of Gascony. In 1257, the king's debts were so great, and the rapacity of his foreign relations so unbearable, that the people were in a state of insurrection. The barons assembled, and, under the direction of De M., held the celebrated parliament at Oxford. They passed statutes to enforce the provisions of Magna Charta. The king swore to observe them, but sent forthwith to the pope praying to be absolved from his oath. The bull of absolution arrived. Henry set his barons at defiance, shut himself up in the Tower, and appealed to Louis of France. England was now in arms. The whole middle class looked up to De M. as their champion and leader, and the war began with the battle of Northampton. The wars of the barons, under De M., have been superficially viewed but as the strife of turbulent nobles, who, in the absence of foreign warfare, employed themselves in getting up a contest at home. Later researches, however, have shown that but for the struggles of De M. and the barons, the concessions at Runnymede would have been a mere worthless parchment. At Lewes, the royal forces were signally defeated, and the king taken captive. A French chronicler, who praises De M. as "noble, chivalrous, and the ablest man of the age," expressly adds that he was "backed by the general favor of the people," who at this time were so "unspeakably trampled under foot, and deprived of all their liberties." The conditions exacted from the king were, that he should observe Magna Charta and the Charter of the Forests; be moderate in his expenses and grants, until his old debts were paid off, and he was enabled to live on his own property, without oppression of merchants or the poor; and that Englishmen only should be chosen counsellors. No new pretensions were introduced, even at this moment of triumph, and the constitutional maxim of respecting the person of the king was carefully upheld. The queen (Elinor of Provence), who was in France, now occupied herself in collecting a large army. To deliberate upon the measures to be adopted at this great crisis, writs were issued to the sheriffs, in 1265, by De M., directing them to return two knights for each county, and two citizens or burgesses for every city and borough; and from this time may be clearly dated the recognition of the Commons as an estate of the realm in parliament. Guardians had been appointed by the barons to watch over the execution of Magna Charta, but fifty years of encroachment on the part of the crown, convinced De M. that a stronger and more enduring security would be to commit the care of constitutional freedom thenceforth to the people themselves, whose interests the barons thus identified with their own. Mr Blaauw, who, in his "Barons' War," presents De M. almost for the first time in his true character, adds, that "it should be an honest pride to us in after-times that English liberty thus owes its birth to this noblest parentage, confidence in the people." A second war broke out, and this time the popular cause was weakened by defection and treachery. Prince Edward (afterwards Edward I.) encountered the barons at Evesham, with a greatly superior army. When defeat was inevitable, the great leader refused to flee. He "fought stoutly like a giant for the liberties of England," but fell, overwhelmed by numbers. The death of De M. filled the whole land with mourning. Like Cromwell, whose career in many respects resembles his own, he was deified a grave by the royalists, his head being sent to Wigmore Castle, and his mutilated limbs to different towns; but the people bewailed their dead champion, and the clergy pointed to his glorified spirit in heaven. The influence of De M. was felt after his death. No baron was executed for bearing arms against his sovereign, and although the Oxford Statutes were formally rescinded, their spirit remained. See "Life," by M. Crelighton (1876); and "Simon de Montfort" by Paull, translated by Una M. Goodwin (1876).

MONTGOLFIER, Jacques Etienne and Joseph Michael, two brothers, distinguished as the inventors of the first kind of Balloons (q. v.). They were the sons of a celebrated paper-manufacturer at Annonay, in the department of Ardèche, and early engaged themselves in the same branch of industry. Etienne, after a few unsuccessful experiments with the balloon, repaired to Paris; but though his discovery

created a great sensation, and was followed out in practice by many eminent men, he obtained little pecuniary aid in carrying on his experiments, and at length retired to his native town, where he resumed the manufacture of paper, and died at Servieres in 1799.—His elder brother, Joseph, the sharer of his labors and his glory, was a man of much genius and little education; but the two brothers were fitted to supplement each other's deficiencies, and together they made many discoveries, and were both received as members of the French Academy. Joseph invented the hydraulic screw, the calorimeter, &c., and in the latter part of his life filled a post in the department of Arts and Manufactures. He died at Paris in 1810.

MONTGOMERY, Gabriel, Comte de, a French knight of Scottish extraction, and an officer in the Scottish Lifeguard of the king of France, was born about 1530. At a tournament given, 30th June 1559, by Henry II. in honor of his daughter's marriage with Philip of Spain, the king insisted upon young M. entering the lists with him. M. reluctantly complied, and the shaft of his broken lance entering the king's visor at the eye, Henry II. was borne insensible from the ground, and so continued for eleven days, when he died. M., although blameless, left France, and soon after embraced Protestantism in England. On the commencement of the religious wars in 1562, he returned to his native country to support the Protestant cause, and defended Rouen with great bravery. In the third religious war, he was one of the leaders of the Protestants, and gained many advantages over the royalists in Languedoc and Bearn. During the massacre of St Bartholomew, he happened to be at Paris, and owed his escape to the swiftness of his horse, and fled to England. In April 1573, he appeared off Rochelle with a small fleet, but failed in accomplishing anything, and was obliged to retire. Next year, at the head of a band of Huguenots, he landed in Normandy, and commenced war there; but being compelled at last to surrender the castle of Domfront, he was carried to Paris; and although the general to whom he surrendered had assured him of his life, he was beheaded, after long imprisonment, 21th May 1574. Brantome describes him as naturally the most nonchalant and pleasure-loving of men, but that, when once he had mounted his saddle, there was not a more daring or vigilant warrior in all Christendom.

MONTGOMERY, James, a minor British poet, the son of a Moravian preacher, was born at Irvine, Ayrshire, November 4, 1771, and at the age of seven was sent too the Moravian settlement at Fulneck, near Leeds, in order to complete his education for the Moravian pastorate. At Fulneck, the course of study seems to have been to severe in its character for the young poet; the imaginative side of his mind was allowed no recognition, and it was only by stealth that he read Cowper's poems and "Robinson Crusoe." Much of his leisure time at school was employed in the composition of verses and of music, in which he took much delight. In 1789, he ran away, and, after four years of various employment, became engaged as clerk to Mr Galea, editor of "The Sheffield Register," for which he soon began to write political articles. In 1794, he commenced a newspaper of his own, "The Sheffield Iris," which he continued to edit till 1825, when he retired. During the period of his editorship, M. was twice subjected to fine and imprisonment, by government. In 1795, he was fined £20, and sentenced to three months' imprisonment, for printing off some copies of a miserable ballad in which government suspected that sedition lurked, and in 1796, he was fined £30, and imprisoned for six months, for giving an account of a Sheffield riot. He received a government pension of £150 in 1835, and he died at his own house in Sheffield, April 30, 1854. His principal works are—"The Wanderer of Switzerland" (1806); "The West Indies" (1809); "The World before the Flood" (1812); and "The Pelican Island, and other Poems" (1827). A collected edition of his minor poems appeared in 1851, and in 1853, his "Original Hymns for Public, Private, and Social Devotion," closed the series of his publications.

His poems are melodious, full of picturesque description, and the gentlest human feeling. The personages introduced in his poems are, however, only shadows, or touched with the faintest color of character. But he claims a well-defined position among the favorite poets of his country by several of his hymns and minor poems, and by his exquisite verses on Home, which commence the third part of "The West Indies."

MONTGOMERY, Robert, a preacher and verse-maker, who has gained notoriety, if not fame, was born at Bath in 1807. He graduated B.A. at Oxford in 1833, M.A.

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in 1833, and was ordained in 1835. In 1836, he became minister of Percy Street Episcopal Chapel, London; he afterwards removed to Glasgow, where he preached for four years, but returned to London, and resumed office at Percy Street Chapel in 1843. He died December 8, 1855. M.'s works comprise a large number of volumes in prose and verse, on themes more or less sacred. He is best known by his poems. "The Omnipresence of the Deity" (1828) has passed through 26 editions. But his celebrity may be said to have died with him, and his works have already become part of the lumber of libraries. This result has been brought about to some extent by the judgment which Macanlay passed upon "The Omnipresence" and other works by this author.

**MONTGOMERY**, a city and the capital of Alabama, United States, is on the left bank of the Alabama River, 415 miles above Mobile, at the head of steam-boat navigation. The city is very handsomely built, with elegant residences and gardens on a cluster of hills, on one of which is a handsome state-house. It has a law-school, several academies, fourteen churches, five banks, four papers, marble-works, iron-foundries, and is one of the largest cotton-marts in the state. M. is connected with four lines of railway. It became, in 1860, the capital of the Confederate States, and continued to be the seat of government until, on the secession of Virginia, it was removed to Richmond. Pop. in 1870, 10,583; 1880, 16,713.

**MONTGOMERYSHIRE**, an inland county of North Wales, between Shropshire on the e., and the Welsh counties, Merioneth and Cardigan, on the w. Area, 483,823 statute acres, of which only about 80,000 are under tillage; pop. (1871) 67,623. The surface is almost wholly mountainous, a large portion consisting of bleak elevated moorlands; but toward the English border, there are several warm, fertile, and well-wooded valleys. The Severn, the Vyrnwy, and the Dovey are the principal rivers. The county belongs almost entirely to the basin of the Severn. The mineral wealth of M. is not great, but copper, lead, and zinc are procured, and millstones, slates, and limestone are quarried. On the uplands, the soil is poor, and suited principally for mountain pasture; but in the valleys, grain and flax are raised. Cattle and sheep, and the pure breed of Welsh ponies called "Merlins," are reared. The Welsh-flannel manufacture is extensively carried on in the county. The capital is Montgomery; pop. (1871) 1255, from which the county received its name, and which was so called from Roger de Montgomery, Earl of Arundel and Shrewsbury, who, in 1093, recaptured the town and castle which had been wrested during the previous year by the Welsh from the founder, Baldwin, lieutenant of the Marches to William the Conqueror and William Rufus. The county sends one member to the House of Commons. The county business is carried on at Welshpool and Newtown alternately. There is an excellent trade in cattle and horses. Offa's Dyke traverses the south-east corner.

**MONTH**, originally the period of the moon's revolution round the earth. If this is reckoned from the position of the moon among the stars to her return to the same position, the period is called a *sidereal* month, and consists of 27 days, 7 hours, 43 minutes, 11½ seconds; but if from new moon to new moon, it is longer, being 29 days, 12 hours, 44 minutes, 3 seconds; this is called a *synodic* month (see Moon). The latter period forms one of the three natural measures of the lapse of time, and, notwithstanding that its efficiency depends on the state of the atmosphere, it ranks next to the day in importance. There are several other periods used by astronomers to which this name is applied, as the *tropical* or *periodic* month (27 days, 7 hours, 43 minutes, 47 seconds), reckoned from the moon's passing the equinox till her return to the same point; the *nodal* month (27 days, 5 hours, 5 minutes, 29 seconds), from ascending node to ascending node; the *anomalistic* month (27 days, 13 hours, 18 minutes, 37 seconds), from perigee to perigee; and the *solar* month, which is the twelfth part of a solar year, consisting of 80 days, 10 hours, 29 minutes, and 4 seconds. Distinct from all these is the *civil* or *calendar* month, fixed by law for ordinary purposes, and consisting of a fixed number of days—from 28 to 31—according to the particular month. The calendar months, with the number of days belonging to each, are given below.

See also the separate months under their own heads. The names by which the months are designated throughout Christendom were given them by the Romans; and though Charlemagne in the 9th c., and the French Directory in the end of last

century, attempted to substitute descriptive epithets, the old-established names continued to be preferred.

	Days.		Days.
1. January.....	31	7. July.....	31
2. February.....	28	8. August.....	31
“ (leap years).....	29	9. September.....	30
3. March.....	31	10. October.....	31
4. April.....	30	11. November.....	30
5. May.....	31	12. December.....	31
6. June.....	30		

**MONTHOLON**, Charles Tristan de, *Comte*, afterwards *Marquis de*, descended from an ancient French family, was born at Paris, 1782. At the age of ten he entered the navy, but exchanged it for the army in 1798. His rise was rapid. He displayed great zeal on behalf of the First Consul in the revolution of the 18th Brumaire, in the capacity of *chef d'escadron*. He served in a number of campaigns, and was severely wounded at Wagram. Napoleon made him his chamberlain in 1809. He was made a general of brigade in 1814, and appointed to the chief command in the department of Loire. On Napoleon's abdication, M. remained in France, but held aloof from the Bourbons. No sooner had the Emperor escaped from Elba and landed at Frejus, than M. hastened to join him. He was present at Waterloo, and accompanied Napoleon to St Helena, continuing his devoted attentions to him till he breathed his last, and being named in his will as one of his trustees, spared no exertion to carry its provisions into effect. Along with General Gourgaud, he published “*Mémoires pour servir à l'histoire de France sous Napoléon, écrits à Ste.-Hélène sous sa dictée*” (8 vols. Par. 1823). He afterwards published a work entitled “*Récit de la Captivité de Ste.-Hélène*” (Lond. 1847). In the proclamations which Louis Napoleon issued on his landing at Boulogne in 1840, M. was named chief of his staff, and on this account he was condemned by the Chamber of Peers to 20 years' imprisonment; but he was afterwards pardoned. He died 21st August, 1853.

**MONTI**, Vincenzo, the great regenerator of modern Italian poetry, was born 19th February 1753, in the Roman province of Ferrara, and studied in the university of Ferrara. On the termination of his studies, he repaired to Rome (1778), where the patronage of friends obtained for him the post of secretary to the pope's nephew. During his abode in Rome, he became involved in a bitter squabble with Alfieri, whose fame as the master-tragedian of Italy was then high in the ascendant—a fact which may have been unpalatable to M., in consequence of the failure of his own dramatic attempts. The assassination of Basville, the republican envoy of France, afforded to M. a subject for his poem, “*La Basvilliana*.” His two succeeding poems, the “*Misogonia*” and the “*Feroniade*,” contained the bitterest invectives against France and Bonaparte; but on the appearance of a French army before Rome, M., with the inexcusable inconsistency which characterised his political conduct throughout, hastened to espouse the cause of France, and to invoke the protection of Bonaparte. M. was shortly after appointed secretary of the Cisalpine Directory; and in 1799 repaired to France, where he undertook the translation of Voltaire's poetical works. On returning to Italy, he was appointed professor in the university of Pavia; and in 1805, on Bonaparte being proclaimed king of Italy, M. was appointed state historiographer. On the fall of the Empire, M. became the eulogist of the Austrian possessors of his country. In the midst of all these political vicissitudes, he pursued with vigor his studies of the classics, and accomplished one of his greatest works, the translation of the “*Iliad*” into Italian verse. M. died at Milan, 13th October 1828, of an apoplectic stroke, and was sincerely lamented, notwithstanding the many opponents his hasty susceptibility had created in life. The best editions of his works are those of Milan (1825–1827, 8 vols.), and his “*Opere Inedite e Rare*” (Milan, 1832–1833, 5 vols.). M. had a warm admiration of Dante, and partook, in some degree, of the spirit of the great master. His chief works are distinguished by sustained grandeur of imagery and diction, by daring flights of imagination, and by the delicacy, elevation, and fire of the sentiments expressed. They are too numerous for separate notice, but the best of them rank among the noblest productions of Italian genius.

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**MONTILLA**, a town of Spain, in the modern province of Cordova, and 20 miles south-south-east of the city of that name. It stands on a hillside rising from the south bank of a tributary of the Xenil. Manufactures of coarse linen and earthenware are carried on, and oil-mills are in operation. A famous wine is grown in the vicinity. *M.* is the birthplace of Gonzalo de Cordova, the "Great Captain." Pop. 15,000.

**MONTJOIE ST DENIS**, the war-cry of the old kings of France, said to be as ancient as the days of Clovis, and from which the king-of-arms, Montjoie, who had exclusive jurisdiction in France, derived his title.

**MONTLUÇON**, a town of France, department of Allier, is picturesquely situated on a hill on the right bank of the Cher, 40 miles west-south-west of Moulins. It has some coarse cloth manufactures, and trade in corn, wine, and fruits. It has also iron-works and plate-glass manufactories. Pop. (1876) 21,904. At a distance of 10 miles are the wells of Nèris-les-Bains, celebrated in the time of the Romans—of whom many traces are left—and still much frequented by invalids.

**MONTMARTRE**. See **PARIS**.

**MONTMORENCY**, Anne, first Duc de, Marshal and Constable of France, born March 1493, belonged to one of the oldest and greatest of the noble families of France. He received, it is said, the name of *Anne* from his godmother, Anne of Brittany. He distinguished himself by his gallantry and military skill in the wars between Francis I. and the Emperor Charles V., and was taken prisoner along with his sovereign in the battle of Pavia, which was fought against his advice. He afterwards became the leader of the French government, shewing great ability in matters of finance and diplomacy, and was made Constable in 1533; but his rough manners made him an object of dislike to many; and the suspicions of the king having been aroused against him, he was suddenly banished from court in 1541, and passed ten years on his estates, till the accession of Henry II., when he came again to the head of affairs. In 1557, he commanded the French army which suffered the terrible defeat of St Quentin, in which he was taken prisoner. During the minority of Charles IX., *M.*, with the Duke of Guise and the Marshal St André, composed the famous triumvirate which resisted Catharine de' Medici. In 1562 and 1567, he commanded the royal army against the Huguenots, and in both wars gained victories over them, but received a fatal wound at St Denis, and died at Paris on the following day, 12th November 1567.

**MONTMORENCY**, Henri, second Duc de, grandson of the famous Constable de Montmorency, born at Chantilly, 30th April 1593. His godfather was the great *Henri Quatre*, who always called him his "son." When he was 17 years of age, Louis XIII. made him Admiral, and he defeated the Huguenots in Languedoc, and took the Isle of Ré from those of Rochelle. He afterwards gained other victories over them, and in 1680 received the chief command of the French troops in Piedmont, where he defeated the Spaniards, for which he received a marshal's baton. Unhappily for himself he ventured to oppose Richelieu, who had always been his enemy, and espoused the cause of Gaston, Duke of Orleans; for this he was declared guilty of high treason, and Marshal Schomberg being sent against him, defeated him at Castelnaudary, and took him prisoner. *M.*, although almost mortally wounded, was carried to Toulouse, sentenced to death by the parliament, and notwithstanding his expressions of penitence, and the most powerful intercession made for him—for example, by King Charles I. of England, the pope, the Venetian Republic, and the Duke of Savoy—was beheaded, 30th October 1632. *M.* was distinguished for his amiability and the courtesy of his manners, as well as for his valor.

**MONTORO**, a town of South Italy, in the province of Avellino, built partly on the slope and partly around the base of a hill, 13 miles north of Salerno. Pop. 4721. It forms the central point of several villages, and has large markets and some linen and cloth manufactures.

**MONTORO**, a pleasant town of Spain, in the modern province of Cordova, built on a rocky ridge around which winds the Guadalquivir, 26 miles east-north-east of Cordova. It contains one of the best hospitals in Andalusia. Hardly any drinkable water can be obtained within the town. The heights in the vicinity are clothed

with olive plantations, and oil is largely exported from this quarter. Woollens and earthenware are manufactured. Pop. 10,500.

**MONTPE'LIER**, the capital of Vermont, United States of America, is on the Winooski River, 215 miles north-north-west of Boston. It is a picturesque village, with a handsome state-house, 7 churches, 2 banks, 4 newspapers, iron foundry, flour-mills, and manufactures of carriages, hats, lumber, &c. Pop. (1880) 3219.

**MONTPELLIER** (Lat. *Mons peesulanus* or *puellarum*), a city of France, in the department of Hérault, in 43° 36' n. lat., and 3° 50' e. long. Pop. (1876) of the town alone, 51,838. Seen from a distance, M. has an imposing appearance, from the number of its towers, steeples, and cupolas; but although its suburbs are clean and well built, the interior of the old town disappoints expectation, being chiefly remarkable for its crooked, dark, narrow, and dirty streets. The public walks, known as those of the Peyron, and some of the other more elevated points, afford glorious views, embracing the Mediterranean, the Alps, the Cevennes, and the Pyrenees. The most noteworthy buildings are the cathedral, the theatre, the exchange, the Hall of Justice, the prefecture, the observatory, and the university. The last, which was founded in 1196, is composed of three faculties—that of medicine, founded in the 12th c. by Arabian physicians, and still ranking among the best in Europe—that of the exact, and that of the physical sciences. M. has a botanical garden, the oldest in Europe; a public library of 50,000 volumes, and a pharmaceutical school; admirable museums, natural history and fine art collections, &c. The industrial products of M. are pigments and other chemical preparations, brandy, liquors, perfumes, soap, corks, sugar, cotton, woollen, and fine leather goods; and the trade, which is very important, includes, besides these articles, wine, seeds, olive-oil, and fruits. Railways to Marseille, Pette, and other ports, besides various canals, facilitate commercial and social intercourse, and few cities of the empire hold out greater attractions in regard to intellectual culture than Montpellier. Its geographical position has led to its being selected as a place of residence for consumptive patients; but the extreme clearness, and even sharpness of the air in the more elevated parts of the town, the occasional occurrence of the icy wind known as the *Mistral*, and the sudden accession of overpowering heats, would seem very materially to counteract some of its long reputed advantages.

**MONTREAL**, the largest city of Lower Canada and of British America, lies in lat. 45° 31' n., long. 73° 35' w., on the left bank of the St Lawrence, 180 miles above Quebec, and 200 below Lake Ontario, 400 from New York, and 2750 from Liverpool. Its eastern suburb, which is now an incorporated village, called Hochelaga, was originally the site of an Indian village of the same name, discovered in September 1535 by Jacques Cartier; and it is from his admiring exclamation at the view obtained from the neighboring hill, that M. (corrupted from Mont Royal) derives its name. The westernmost permanent settlement which the French obtained in Canada, it was under them merely an outpost of Quebec, and continued to be such under British rule till 1832, when it became a separate port. Since then, the rapidity of its progress has been astonishing. By the deepening of the shallower parts of the river above Quebec, M. is now accessible to vessels of over 3000 tons burden, and drawing from 19 to 22 feet. Its harbor, lined with wharfs for a mile and a quarter, at which 125 ships could lie at one time, is, from its inland position (90 miles above the influence of the tides), perfectly safe. Situated at the head of the ocean-navigation of the St Lawrence, M. has naturally become the dépôt for the exports and imports of all the Canadas. At the same time, the obstruction to vessels sailing further up the river, caused by the rapids, has been surmounted by magnificent canals. The canals connecting M. with Lake Ontario have locks of 200 feet by 45, with 9 feet of water on the sills; the locks of the Welland Canal are rather smaller. As M. lies also near the confluence of the Ottawa and St Lawrence, it is in immediate connection with the vast lumber-country adjoining the former river and its tributaries; while a canal has been projected to connect the Ottawa, through Lake Nipissing, with the Georgian Bay in Lake Huron, which, if carried out, will probably bring the produce of the north-western states, as well as of Western Canada, through M., as it would give them an outlet to the ocean between 200 and 300 miles shorter than by the Erie Canal. But even at present, while navigation is open, an extensive daily



Montreal  
Montrose

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traffic is carried on, by steamers and sailing-vessels of every description, with Lake Ontario and the Ottawa district, as well as with the Lower St Lawrence; and the ships of the Montreal Ocean Steam-ship Company, by aid of a subsidy from the Canadian government, keep up a weekly communication with Liverpool, while at the same time the harbor is constantly crowded with vessels from other foreign ports. After the navigation of the St Lawrence is closed, the ocean steamers find a harbor at Portland, Maine, which is connected with M. by a railway of 292 miles. This line belongs to the Grand Trunk Railway Company, and crosses the St Lawrence at M. by the celebrated tubular Victoria Bridge, the length of which, including its two abutments and 24 piers, is above a mile and three-quarters. By the lines of the same company, M. has railway communication with Upper Canada, the western states, and Lower Canada, while the Intercolonial Railway opens up communication with Halifax and St John. Several other lines afford direct communication with all the important cities and towns in New York state and the states of New England. The position, therefore, of M. as a centre of commerce is perhaps unequalled, and its rapid advance in consequence has placed it, within the last few years, among the first commercial cities of the American continent—second perhaps only to New York. Its exports, imports, and duties collected during the four years previous to 1862 were as follows: 1853—exports, £684,538; imports, £2,450,515; duty collected, £334,768. 1859—exports, £608,952; imports, £3,110,714; duty collected, £467,248. 1860—exports, £1,204,143; imports, £3,066,809; duty collected, £490,770. 1861—exports, £2,083,147; imports, £3,239,515; duty collected, £478,695. For the year ending June 30, 1870, these items had attained the following greatly increased proportions: Exports, £3,979,252; imports, £5,350,169; duty collected, £860,000. In 1873, the value of exports was £4,935,527; of imports, £11,064,139. The value of assessed property in 1873 was £12,712,230; in 1857 it was only £4,609,097. The population has risen in like manner. In 1840, it was about 27,297; in 1852, it was 57,716; in 1854, about 65,000; in 1861, 90,323; and in 1871, 167,325. The number of sea-going vessels arriving in the port of M. in 1873 was 422; in 1856, the number of sea-going vessels was only 232. The harbor is open on an average about eight months, from the latter half of April to the beginning of December.

The most conspicuous building in M., which is perhaps also the finest church on the continent of America, is the Roman Catholic cathedral. Built in the Gothic style of the 13th century, it comprises seven chapels and nine aisles, and can accommodate between 6000 and 7000 people. It has six towers, of which the three on the main front are 220 feet in height; and its chief window is 64 feet high, and 32 broad. There are several other Roman Catholic churches belonging to the order of St Sulpice, to whose members chiefly M. owes its foundation, and who still hold the seignory of the island on which the city is built. Adjoining the cathedral, is the seminary of St Sulpice, to which a large addition has been built within the last few years at a cost of £5000. The city contains also some of the largest conventual establishments in the world. The general wealth, indeed, of the Roman Catholic Church in M. has grown enormous in consequence of the increased value of the property given to it during the early settlements of the French. The Church of England has recently erected, at an expense of above £20,000, a new cathedral, which is very chaste in style, though somewhat small for a metropolitan see. St Andrew's Church, the most important belonging to the Church of Scotland, is also a very chaste specimen of Gothic architecture, and cost about £10,000. At about the same cost, the Methodists have built a handsome church in the florid Gothic style. Besides the Roman Catholic college in College Street, St Mary's College of the Jesuits, and a Baptist college, M. possesses an important university under the name of McGill College. Founded by a bequest of the Hon. James McGill in 1811, erected into a university by royal charter in 1821, and reorganised by an amended charter in 1852, it has now, besides its principal, the distinguished naturalist, Dr Dawson, a staff of 29 professors, and has an attendance of upwards of 300 students. M. is supplied with water by magnificent works, which cost about £120,000. The water is brought from the St Lawrence above the Lachine Rapids by an aqueduct five miles long to a pond, from which it is forced up by power derived from part of its surplus waters into reservoirs capable of containing 20 millions of gallons, and situated 200 feet above the level of the river. Along the side of the

"Mountain," there is a line of mansions, which command the view that astonished J. Cartier, and which may compare with the suburban mansions of the wealthiest cities in Europe or America. M. returns three members to the provincial parliament.

**MONTREAL**, the large and fertile island on which the city of the same name is built, is 30 miles long, 10 miles at its greatest breadth, and contains 197 square miles. Formed by the separation of the two channels by which the Ottawa issues into the St Lawrence, its surface, except at Mount Royal, is only diversified by gentle undulations, which run from north-east to south-west, and are named *Coteaux*. The island forms a county, divided into two ridings, the East, or *Hochelaga*, and the West, or *Jacques Cartier*, each of which returns a member to the provincial parliament.

**MONTROSE**, a royal and parliamentary burgh and seaport on the north-east coast of Scotland, in the county of Forfar, and situated at the mouth of the river South Esk, about 80 miles north-east of Edinburgh, and 40 miles south of Aberdeen. It stands on a level peninsula between the basin of the Esk (an expanse 7 miles in circumference, and dry at low water) and the mouth of the river. A fine suspension-bridge, 432 feet long and 26 feet broad—erected in 1828—1829 at a cost of nearly £30,000—connects the town with Rossie Island, which is again connected with the mainland by a small draw-bridge. The Royal Lunatic Asylum, opened in 1868 at a cost of upwards of £30,000, accommodates about 400 patients. Between the town and the shore are the "Links" or downs, among the finest in Scotland for golfing or cricketing. The harbor affords excellent accommodation to vessels of large tonnage, there being 18 feet of water on the bar at low-water of spring-tides, and is one of the best on the east coast. Two lighthouses stand in a line on the north bank of the river, about 400 yards apart; while a magnificent tower, named the Scurdyness Lighthouse, erected by the Board of Trade in 1870 at a cost of nearly £2700—exhibiting a clear white light, visible at nearly 20 miles distance—stands at the mouth of the river. Flax-spinning is the chief manufacture in the town, there being 4 factories of about 500 horse-power in the aggregate, employing upwards of 2000 hands, at a weekly cost of about £1500. There is also a large saw-mill, giving employment to nearly 300 men and boys. Ship and boat building, formerly a staple trade of the town, has greatly fallen off. Education is well represented in the town—the chief institution being the academy. In 1875, 1751 vessels, of 108,773 tons, entered and cleared the port. Imports—coal, lime, slate, iron, flax, and manures; exports—manufactured goods, salmon, herring, dressed wood, and agricultural produce. In 1875, the total value of trade was £404,453. Pop. (1871) 15,720. M. unites with Arbroath, Brechin, Forfar, and Bervie to send a member to parliament.

**MONTROSE**, James Graham, first Marquis of, belonged to a family that can be traced back to the year 1128. Its first notable member was SIR JOHN GRAEME of Dundaff, who fell at the battle of Falkirk, 22d July 1298. Early in the 15th c., Sir William Graham married for his second wife a daughter of Robert III. ROBERT, the eldest son of this marriage, was ancestor of the Grahams of Claverhouse. The third Lord Graham, created Earl of Montrose by James IV., fell at Flodden; his eldest son at Pinkie. The next in succession became vicaroy of Scotland after James VI. had ascended the throne of England. His eldest son, John, who succeeded to the earldom in 1616, married Lady Margaret Ruthven, eldest daughter of William, first Earl of Gowrie, and sister of the unfortunate nobleman who gives name to the *Gowrie Conspiracy*. The issue of this union was five daughters and one son, James, the "great Marquis," who was born in 1612, according to tradition, in the town of Montrose. His mother died in 1618, his father in 1626. In the following year, the boy was sent to the university of St Andrews by his guardian and brother-in-law, Archibald, Lord Napier, son of the famous inventor of logarithms. He was an apt, if not an ardent student, and during the two or three sessions of his attendance at college, acquired a very respectable amount of classical knowledge, besides exhibiting a genuine predilection for literature, which the stormy character of his after-life never quite destroyed. In his 17th year, he married Magdalene Carnegie, daughter of Lord Carnegie of Kinnaird, on which occasion he had his portrait painted by Jameson, the pupil of Van Dyck. For the next three years he lived

quietly at Klunald Castle, pursuing his studies. On attaining his majority, he left Scotland, to travel on the continent, visited the academies of France and Italy, and perfected himself in all the accomplishments becoming a gentleman and a soldier. On his return, he was introduced to King Charles I., but owing, it is said, to the machinations of the Marquis of Hamilton, was coldly received by that monarch, and had no sooner reached Scotland, than he joined the ranks of the king's opponents, which at this period comprehended the majority of Scotchmen. M. came back in the very year (1637) when the tumults broke out in Edinburgh on the attempt to introduce the Prayer-Book. Whether his conduct at this moment was the result of chagrin, or whether he was carried away by the prevailing enthusiasm, or by the persuasions of craftier persons than himself, is difficult to say. Baillie speaks of his having been "brought in" by "the *canniness* of Rother," a phrase which appears to Mr Mark Napier to indicate that he was trepanned with difficulty into joining the League. At anyrate, the youthful nobleman soon became to appearance one of the most zealous of the Covenanting lords. He was one of the four noblemen selected to compose the "Table" of the nobility, which, along with the other Tables of the gentry, of the burghs, and of the ministers, drew up the famous National Covenant (see COVENANTS), sworn to by all ranks at Edinburgh in the spring of 1638. M. was appointed in the following summer to agitate for subscriptions in Aberdeenshire, where the influence of the Marquis of Huntly was exercised on the side of the king. He did not, however, meet with great success. In 1639, he made three military expeditions to Aberdeenshire to overawe the royalists. The latter were in considerable force under the Marquis of Huntly, but owing to the timid, if not treacherous orders of the Marquis of Hamilton, then governor of Scotland, they were always forced to disband. M. twice took the city of Aberdeen. On the first occasion (29th March), he compelled the inhabitants to subscribe the Covenant, but did no injury to the city. His "too great" humanity is even lamented by Baillie. On the second (25th May), he imposed on the city a fine of 10,000 merks; but though his soldiers pillaged the place, he honourably resisted the importunities of the zealots among the Presbyterian clergy, who wished to expose it to the horrors of conflagration. Baillie again complains of his "too great lenity in sparing the enemy's houses." The arrival at Aberdeen by sea of the Earl of Aboyne—Charles's lieutenant of the north—with some reinforcements, induced M. to retreat, who was followed by the earl and the Gordon Highlanders. At Meagra Hill, near Stonehaven, a battle was fought (15th June) between the two armies, in which M. obtained a complete victory; four days later, he was again master of Aberdeen, after a fierce struggle at the passage of the Dee. The citizens were stricken with alarm, expecting some bloody punishment for their well-known Episcopalian leanings, but M. agreeably disappointed their fears. At a subsequent period, he was upbraided by the Committee of Estates for not having burned the town on this occasion. News of "the pacification of Berwick" now arrived in Aberdeen, and terminated the struggle in the north. Charles invited several of the Covenanting nobles to meet him at Berwick, where he was then holding his court, and to consult with him about Scottish affairs. Among those who went was M., and the Presbyterians dated what they regarded as his apostasy from that interview. Be that as it may, his political position was certainly different after his return. In the General Assembly which met, August 13, 1639, under the presidency of the Earl of Traquair, as royal commissioner, he shewed symptoms of disaffection towards the Covenant, and was the object of much popular obloquy. One night he is said to have found affixed upon his chamber-door a paper bearing these words, *Invictus armis, verbis vincitur*. The dissolution of the parliament, in June 1640, led to an open rupture between the king and the Covenanters, and both parties prepared to decide their quarrel by force of arms. The former assembled at York an army of 21,000 horse and foot; the latter another of 28,000, which, under the command of Leslie, crossed the Tweed, 21st August 1640. M. was the first man that forded the stream. The successes of the Scots, as is well known, soon forced Charles to summon a new parliament for the settlement of the national grievances. Meanwhile M., along with several other influential nobles, had entered into a secret engagement at Cumbernauld, for the purpose of frustrating what they regarded as the factious designs of the extreme Covenanting leaders. His conduct in England, too, had been suspicious. It was accidentally discovered that he had been secretly communicating with the king; and when the parliament assembled

(November 1640), he was cited to appear before a committee. The affair of the *Cum-bernauld Bond*, discovered by the ingenuity of Argyle, was brought up; but M. defended his conduct and that of his colleagues; and nothing came of it, though some fiery spirits among the clergy, says Guthrie, "pressed that their lives might go for it." In the following June, M. and some others were accused of plotting against Argyle, and were confined in Edinburgh Castle, where they remained till the beginning of 1642, when they were set at liberty in return for the concessions which Charles had made in Scottish subjects. Although they had been frequently examined, nothing definite had been proved against them. The accusation that M. had offered to the king to assassinate Argyle, is not historically substantiated, and is intrinsically improbable. During the next two or three years, he kept aloof, outwardly, from public affairs, but he had finally broken with the Covenanters, and had privately ranged himself on the side of the king. The civil war in England had now broken out, and was being carried on with dubious success. Charles and his advisers resolved to crush the Presbyterian leaders in Scotland, who were abetting the efforts of the English Parliamentarians. In the spring of 1644, M. now raised to the rank of marquiss, left Oxford, where he had been residing with his sovereign, and proceeded to Scotland to raise the royalists in the north. The battle of Marston Moor for a moment paralysed him, but his resolution speedily returned. He threw himself into the Highlands, and after skulking about the hills for some time in disguise, met at Blair-Athol some Irish auxiliaries and a body of Highlanders under Alister Maccolli Keitach Macdonald, better known as *Colkitto*, who had forced their way thither from the Western Isles in hopes of joining him. M. instantly placed himself at their head, and the clans quickly rallied round his standard. Marching south, he fell suddenly (1st September) on the Covenanting army commanded by Lord Elcho, at Tippermuir, near Perth, and gained a complete victory. Not a single royalist was slain. The same night, M. entered Perth, where he remained for three days, levying a fine of 9000 merks on the inhabitants. He then set out for the north, defeated a force of Covenanters under Lord Burleigh at Aberdeen (September 13), and took possession of the city, which was abandoned for four days to all the horrors of war. The approach of Argyle, at the head of 4000 men, compelled M., whose forces were far inferior in numbers and discipline, to retreat. He now plunged into the wilds of Badenoch, recrossed the Grampians, and suddenly appeared in Angus, where he wasted the estates of more than one Covenanting nobleman. Having obtained fresh supplies, he once more returned to Aberdeenshire, with the view of raising the Gordons, narrowly escaped defeat at Fyvie in the end of October, and again withdrew into the fastnesses of the mountains. Argyle, baffled in all his attempts to capture or crush M., returned to Edinburgh, and threw up his commission. His opponent, receiving large accessions from the Highland clans, planned a winter campaign, marched south-westward into the country of the Campbells, devastated it frightfully, drove Argyle himself from his castle at Inverary, and then wheeled north, intending to attack Inverness, where the Covenanters were posted in strong force under the Earl of Seaforth. The "Estates" at Edinburgh were greatly alarmed, and raising a fresh army, placed it under the command of General Baillie, a natural son of Sir William Baillie of Lamington. After consulting with Argyle, it was arranged that he should proceed by way of Perth, and take M. in front, while Argyle should rally his vast array of vassals, and attack him in the rear. The royalist leader was in the great glen of Albin—the basin of the Caledonian Canal—on his way to Inverness, when he heard that Argyle was following him. He instantly turned on his pursuer, fell upon him unexpectedly at Inverlochy, February 2, 1646, and utterly routed his forces. Fifteen hundred of the Campbells were slain and only four of M.'s men. He then resumed his march northwards, but did not venture to assault Inverness—his wild mountaineers being admirably fitted for rapid irregular warfare, but not for the slow work of beleaguering. Directing his course to the east, he passed—with fire and sword—through Elgin and Banff into Aberdeenshire, which suffered a similar fate. Baillie, and his lieutenant, Hurry, were at Brechin, but M., by a dexterous movement, eluded them, captured and pillaged the city of Dundee (April 3), and escaped safely into the Grampians. On the 4th of May, he attacked and routed Hurry at Aldern, near Nairn; and after enjoying a short respite with his fierce veterans in Badenoch, again issued from his wilds, and

inflicted a still more disastrous defeat on Baillie himself at Alford, in Aberdeenshire (July 2). There was now nothing to prevent his march south, and about the end of the month, he set out with a force of from 5000 to 6000 men. He was followed by Baillie, who picked up reinforcements on his way, and on the 15th of August again risked a battle at Kilsyth, but was defeated with frightful loss—6000 of the Covenanters being slain. The cause of Charles was for the moment triumphant; M. was virtually master of the country. The king formally appointed him lieutenant-governor of Scotland, and commander-in-chief of the royal forces. All the principal cities in the west hastened to proclaim their fidelity, and laid the blame of the recent troubles on the unfortunate Presbyterian clergy. But affairs soon took a very different turn. Great numbers of the Highlanders returned home—we might even say, deserted—burdened with multifarious plunder; and the Earl of Aboyne withdrew with all his cavalry. M.'s position in a district teeming with enemies, was growing critical, and on the 4th of September he broke up his camp at Bothwell and marched for the eastern counties, where Charles had informed him that the Earls of Traquair, Home and Roxburgh were ready to join him. In this he was disappointed, and on the 18th of the same month he was surprised at Philiphaugh, near Selkirk, by David Leslie, who fell upon the relics of M.'s army and his raw levies with 6000 cavalry—the flower of the Scottish forces then serving in England—who had been hurriedly despatched home on the news of M.'s startling successes. Leslie completely annihilated his opponent. "On Philiphaugh," says Sir W. Scott, "M. lost the fruit of six splendid victories." Escaping from the field of battle, he made his way to Athol, and again endeavored, but in vain, to rouse the Highlands; and at last Charles, now beginning to get the worst of it in the civil war, was induced to order him to withdraw from the kingdom. On the 3d of September 1646, he sailed for Norway, whence he proceeded to Paris. Here he endeavored, but in vain, to induce Henrietta Maria to bestir herself on behalf of her husband. The queen coldly received all his suggestions, and at last M., in despair, betook himself to Germany, in hope of service under the emperor, but soon after returned to Holland and entered into communications with the Prince of Wales, afterwards Charles II. It was here that news of Charles I.'s execution reached him. M. fainted on receipt of the dreadful intelligence, and gave way to the most passionate regrets. Charles II. now re-invested him with the dignity of lieutenant-governor of Scotland, and M. undertook a fresh invasion on behalf of the exiled monarch. In March 1650, he arrived at the Orkneys with a small force, and after the lapse of three weeks proceeded to Caithness; but neither the gentlemen nor the commons would rise at his call. He forced his way as far south as the borders of Ross-shire, where his dispirited troops were attacked and cut to pieces at a place called Corbiesdale, near the pass of Invercarron, by a powerful body of cavalry under Colonel Strachan. M. fled into the wilds of Assynt, where he was nearly starved to death, when he fell into the hands of M'Leod of Assynt, who delivered him up to General Leslie, by whom he was brought to Edinburgh. Condemned to death as a traitor to the Covenant, he was executed 21st May 1650. His demeanor in his last moments was very noble and dignified.

**MONTSEERRA'T**, one of the Lesser Antilles, belonging to Britain, lies 43 miles north-west of Guadeloupe, and at a similar distance from Antigua and St Kitts. It is about 11 miles in length, 7 in breadth, and contains an area of 47 English square miles. The population in 1871 was 8693, the females exceeding the males by 737. About two-thirds of the surface is mountainous and barren, the rest is well cultivated. The chief products are sugar, limes, rum, and molasses; but cotton, arrow-root, and tamarinds are also exported. The island forms a portion of the government of the Leeward Isles, and is directly ruled by a president, aided by a council and house of assembly. The chief town is Plymouth, on the south coast. The revenue of M. in 1874 amounted to £4648, and the expenditure to £5093. In 1873, the tonnage of vessels which entered and cleared its port was 13,213; and the total values of imports and exports in 1874 were respectively £23,938 and £38,079.

**MONTSEKRAT** (Lat. *Mons Serratus*, so named from having jagged ridges like the teeth of a saw), a mountain of Catalonia, in the north-east of Spain, about 30 miles from Barcelona. Its height is 3919 feet. "Its outline," says Ford ("Handbook for Spain," vol. i. p. 419), "is most fantastic, consisting of cones, pyramids, battresses, nine-pins, sugar-loaves, which are here jumbled by nature in a sportive mood." The pious Catalonians aver that it was thus riven and shattered at the

**Crucifixion.** Every rift and gorge is filled with box-trees, ivy, and other evergreens. From the topmost height the eye wanders over all Catalonia, and from the sea the ridge looks like an immense wall with seven pyramidal peaks. The mountain, however, owes its celebrity not to its extraordinary appearance, but to the Benedictine Abbey built upon it, at an elevation of 1200 feet, and to the 13 hermitages formerly perched like eagles' nests on almost inaccessible pinnacles. In 1811, the French, under Suchet, plundered the abbey, burned the library, shot the hermits, and hung the monks (who had given shelter to their emigrant brethren at the Revolution). The place suffered still more in 1827, when it became the stronghold of the Carlist insurrection.

**MONUMENT** (Lat. *monumentum*, from *monere*, to remind), anything durable made or erected to perpetuate the memory of persons or events. The chief kinds of monuments are described under their special names. See CAIRN; CHROMLECH; SEPULCHREAL MOUNDS; PILLAR; OBELISK; PYRAMID; ARCH; TRIUMPHAL; BRASSES; TOMB; STUPA; MAUSOLEUM, &c.

**MONZA** (anc. *Medætia*), chief town of a district in the province of Milan, stands on the river Lambro, 10 miles north-north-east of Milan, with which it is connected by railway. Pop. (1872) 16,000. It is essentially a town of Lombard growth, and under the Lombard sovereigns was capital of their kingdom. It owes much of its early importance, and its chief public edifices, to Theodolinda, the great queen of the Lombard dynasty. In the middle ages, M. was conspicuous for the wealth of its numerous citizens and nobles, and the extent of its cloth-trade. It has undergone 32 sieges. The cathedral, founded in the 6th c. by Theodolinda, contains many interesting memorials of this great queen. The famous Iron Crown (q. v.) and regalia of Lombardy, employed at the coronation of the German emperors as kings of Italy, were removed from Lombardy by the Austrians in 1859, on the cession of that province to France. The town has a good gymnasium, a theatre, two hospitals, and a philharmonic institution. Its present manufactures of cottons, hats, and preserved meats are daily increasing. M. is surrounded by an exuberantly fertile district, which yields abundance of grain, fruits, wine, and silk, and possesses great beauty of scenery and climate.

**MOON**, The, the satellite of the earth, revolving round the earth from west to east in a period of one *Month* (q. v.), and in consequence accompanying the earth in its motion round the sun. As the moon, to an observer on the earth, advances more than  $13^{\circ}$  to the east daily, whilst the corresponding advance of the sun is barely  $1^{\circ}$ , her progress among the stars is much more notable than that of the latter. This rapid angular motion, the continual and regular variation of her illuminated surface, and her large apparent size (being nearly equal to that of the sun), have rendered the moon an object of general interest; while her importance as the principal nocturnal substitute for the sun, and her special value to navigators and geographers, in the determination of longitudes (see LATITUDE and LONGITUDE), have rendered the *lunar theory* the object of the most thorough and careful investigation.

*Phases of the Moon.*—The first peculiarity about the moon that strikes a casual observer, is the constant and regular change of her illuminated surface from a thin crescent to a circle, and *vice versa*, and a corresponding change in the time of her appearance above the horizon. These changes depend upon the position of the moon relative to the earth and the sun, for it is only the half of the moon facing the sun that is illuminated by his rays, and the whole of this illuminated portion can only be seen from the earth when the sun, earth, and moon are in a straight line (the line of *syzygies*), and the earth is between the sun and moon. When the moon is in the line of syzygies, but between the earth and the sun, no part of her illuminated disc can be seen from the earth. In the former case, the moon is said to be *full*, and in the latter, *new*. A few hours after "new moon," the moon appears a little to the east of the sun as a thin crescent, with the horns pointing towards the east, and as she increases her angular distance from the sun at the rate of about  $12^{\circ}$  daily, the crescent of light becomes broader, till, after the lapse of a little more than seven days, at which time she is  $90^{\circ}$  in advance of the sun, she presents the appearance of a semicircle of light. The moon is then said to have completed her *first quarter*. Continuing her course, she becomes "Gibbous" (q. v.); and at the 15th or 16th day from new moon,

attains a position  $180^\circ$  in advance of the sun, and now presents the appearance known as *full moon*. From this point she begins to approach the sun, again appearing gibbous, and after a third period of more than seven days, reaches a point  $90^\circ$  west of him, and enters her *last quarter*. Here, again, she appears as a semicircle of light, the illuminated portion being that which was not illuminated at the end of the first quarter. The moon now rapidly approaching the sun, resumes the crescent form, but this time with the horns pointing *westward*, the crescent becoming thinner and thinner, till the moon reaches the position of *new moon*, and disappears. From "full moon" to "new moon," the moon is said to be *waning*; and from "new moon" to "full moon," *waxing*. The earth as seen from the moon presents similar phases, and has, consequently, at the time of new moon, the appearance of a round illuminated disc, and at full moon, is invisible. This explains the peculiar phenomenon occasionally observed when the moon is near the sun (either before or after new moon), of the part of the moon's face which is unilluminated by the sun appearing faintly visible, owing to the reflection upon it of strong earth-light. This phenomenon is designated by the Scottish peasantry as "the new mune wi' the auld mune in her arms." At new moon the moon of course comes above the horizon about the same time as the sun, and sets with him, but rises each day about 50 minutes later than on the day previous, and at the end of the first quarter, rises at mid-day, and sets at midnight, continuing to lag behind the sun. When at the full, she rises about sunset, and sets about sunrise, and at the commencement of her last quarter, she rises at midnight, and sets at mid-day.

*Distance and Magnitude.*—From repeated observations of the moon's horizontal *Parallax* (q. v.), and of the occultations by her of the fixed stars, her mean distance\* from the earth has been estimated at 237,600 miles, and as her angular diameter averages  $31' 26''$ , her actual diameter is 2153 miles, or a little less than  $\frac{3}{11}$ ths of the earth's diameter. Her volume is therefore about  $\frac{1}{49}$ th of that of the earth, and her density being only  $\cdot 577$  (that of the earth being taken as unity), her mass is only  $\frac{1}{88}$ th of the earth's mass; consequently, the force of gravity at her surface is so much less than it is at the surface of the earth, that a body which weighs 1000 pounds here, would at the moon weigh only 163 pounds.

*Orbit.*—The moon revolves round the earth in an elliptic orbit, with the earth in the focus; the eccentricity of the ellipse being equal to  $\cdot 05491$  of half its major axis, or more than  $3\frac{1}{4}$  times that of the earth's orbit. The plane of her orbit does not coincide with the ecliptic, but is inclined to it at an angle of  $5^\circ 8' 47\frac{1}{2}''$ , and intersects it in two opposite points, which are called the *Nodes* (q. v.). The point at which the moon is nearest to the earth is called her *perigee*, and that at which she is furthest from it her *apogee*, and the line joining these two points is called the *line of apsides*. Were the moon's orbit a true ellipse, which, owing to various irregularities known as *perturbations*, it is not, the *lunar theory* would be exceedingly simple; but these perturbations, which, in the case of the planets, produce a sensible variation in their orbit only after many revolutions, cause, in the case of the moon, a distinct and well-marked deviation from her previous course in a single revolution. The retrogradation of her nodes along the ecliptic causes a continual change in the plane of her orbit, so that if, during one revolution round the earth, she occults certain stars, at the next revolution she will pass to one side of them, and will remove further and further from them in each successive revolution. A little consideration will shew that by this continual change of her orbit, the moon will, in course of time, pass over or occult every star situated within  $5^\circ 24' 30''$  of the ecliptic. The motion of the nodes is so rapid that they perform a complete circuit of the orbit in 6798.39 mean solar days, or 18.6 years. Another important change in the moon's orbit is the revolution of the line of apsides, by which the perigee and apogee are continually changing their position relative to the earth and sun. This revolution is more than twice as rapid as that of the nodes, being performed in 8332.57 mean solar

\* When the moon is at the *perigee*, she is within 225,000 miles, and when at the *apogee* more than 251,000 miles from the earth; her angular diameter as measured from the earth consequently varies from  $28' 45''$  to  $33' 30''$ , and for a particular day is greatest when she is on the meridian, as in this case she is nearer to the spectator by about 4000 miles, than when she is on the horizon.

days, or 8-65 solar years. As this motion is common to all the heavenly bodies, its nature and origin will be treated of under the head of Perturbations (q. v.). Its effect upon the moon is to produce a variation in her distance from the earth, independent of that produced by her elliptic motion.

*Eclipses.*—As the moon in her course passes the sun at the commencement of every (synodic) month, and by the middle of the month has placed the earth between herself and the sun, it is evident that if she moved in the plane of the ecliptic, there would be either a *total* or an *annular eclipse of the sun* at the commencement, and a *total eclipse of the moon* in the middle of every month. The inclination of her orbit allowing her to pass the sun  $5^{\circ} 9'$  to the north or south of his track, prevents such a frequent occurrence of eclipses. If the moon, when in conjunction, is at either of her nodal points, and at the same time near her perigee, a total eclipse of the sun takes place; but if near her apogee, the eclipse is only annular, for at that time her apparent diameter is less than the sun's. If, also, at her conjunction, her latitude north or south is less than the sum of her semidiameter and of that of the sun, a *partial eclipse* takes place, and is greater the nearer the moon is to her node. These partial eclipses are seldom seen from all parts of the earth's illuminated surface, but are confined to a portion of it, which is greater or less according to the extent of the eclipse. Lunar eclipses, which occur when the moon is in opposition (i. e., at full moon), are seen equally from all parts of the earth's surface which are turned towards her. The conical shadow of the earth which is projected into space on the side opposite to the sun, is in length equal to about 3-5 times the moon's mean distance, and a section of it at the moon's distance is  $1^{\circ} 28'$  in diameter. If, then, the moon, which is never more than  $83\frac{1}{4}'$  in diameter, happens to be at or near her node, a total eclipse will take place, and in no case can it be *annular*, as is sometimes the case with those of the sun. Even during total eclipses, the moon is seldom quite invisible, but generally shines with a faint copper-colored light. See ECLIPSES.

*Rotation.*—The moon, like all other satellites, as far as at present known, revolves round her own axis in precisely the same time that she revolves round the earth; she thus presents always the same face to us, and consequently, though her comparative proximity has enabled us to become better acquainted with her surface than with that of any other heavenly body, our knowledge is confined to one-half of her surface, with the slight exception of the knowledge obtained from her *Libration* (q. v.). To the inhabitants of the side of the moon next the earth—if the moon had inhabitants, which is very improbable—the latter would appear as a luminary about  $2^{\circ}$  in diameter, immovably fixed in their sky, or at least changing its position only to the extent due to the moon's libration. The earth would thus seem to them to have a disc about 15 times larger than that of the sun.

*Physical Features.*—The surface of the moon, as seen from the earth, presents a most irregular grouping of light and shade. The dark portions were named by the earlier astronomers as seas, lakes, &c., and still retain these names, although there is strong evidence against the supposition that the moon, or at least that portion of it presented to us, contains any water. The brighter parts of the moon are mountainous, as is proved by the fact of their casting shadows when the sun's rays fall upon them obliquely, and also by the ragged appearance presented by the interior illuminated border of the moon, an appearance which can only be satisfactorily accounted for on the supposition that the surface of the moon is not level, in which case the higher portions will be illuminated some time before the light reaches the level parts; and it is observed that as the illumination proceeds, bright spots start up in advance of it, and when the moon is on the wane, these same spots continue to shine for some time after the surrounding surface is immersed in gloom. The mountains occur either singly, when they are generally of a circular form, and are called *craters*, or in groups, which are mostly annular, and form a sort of wall enclosing a deep depression or plain, in which are situated one or more conical mountains. The craters are not unfrequently 8 or 10 miles in diameter, and some of the walled plains measure more than 100 miles across. The principal mountain range is the Apennines, which crosses the surface from north-east to south-west, and attains, according to some authorities, an altitude of about 20,000 feet, though Sir John Herschel gives about 2 miles as the probable limit of elevation above the moon's surface. The heights are estimated from a micrometric measurement of the length of their shadows, a method not, in this case, susceptible of much



accuracy. The moon everywhere presents traces of volcanic agency, but no active volcanoes have yet been discovered, nor is there any sign of recent volcanic action. Seen through the telescope, she presents a bleak, desolate appearance, without indications of animal or vegetable existence. She appears to be devoid of an atmosphere, or if one exists, it must be of exceeding rarity.

The influence of the moon in causing *Tides* (q. v.) has long been well known, and there is some reason for supposing that she produces a similar effect on the atmosphere, combining with other causes in the generation of winds. Those winds which prevail about the time of new and full moon, and at the vernal and autumnal equinoxes, are particularly ascribed to her influence. On the supposition that the moon might also affect organic nature, experiments were instituted by Mead, Hoffmann, and others; but no certain results were attained. The periodicity which has often been noticed in certain diseases, especially in insanity (hence called *lunacy*), was long supposed to have some connection with lunar influence, and this opinion is held to some extent at the present day. The chemical effects of the moon's rays are, so far as is at present known, feeble, though in particular instances they exhibit an *actinism* as powerful as that of the sun. Decomposition of animal matter takes place more rapidly in moonshine than in darkness, and the moon's rays, when concentrated, have a sensible effect on the thermometer.

The best map of the moon is the large and accurate one of MM. Baer and Mädler, which presents a most minutely detailed picture of her visible surface; the map is 3 feet in diameter. See, for further information, the articles *PERTURBATIONS; LIBRATION; NODES; EYECTION; METONIC CYCLE; TABLES, LUNAR, &c.*

*Superstitions regarding the Moon.*—The moon was anciently an object of worship, and even in the 17th c. she was supposed, by the common people of England, to exercise great influence over human affairs. The times for killing animals for food, gathering herbs, cutting down wood for fuel, sowing seeds of various kinds, were all regulated by the "age" of the moon, and these set periods were considered to be a necessary part of practical knowledge, and ignorance or neglect of them to be infallibly productive of loss. There were similarly defined periods for taking particular medicines, and attempting the cure of particular diseases. Many such superstitious prevailed till a recent period in the Highlands of Scotland, favorable or unfavorable consequences from any occurrence being predicted according to the age of the moon at the time it happened. Throughout Scotland, the waning moon was considered to have an evil influence, and full or new moon to be the most auspicious season for commencing any enterprise. The same opinion was held in Scandinavia and Germany, and the history of all nations teems with similar superstitious. See the article *ECLIPSES*.

In the Edda, we read that "Mundilföri had two children—a son, Måni (moon), and a daughter, Sól (sun);" and in German, the moon is masculine and the sun feminine to this day. It was the same in Aug.-Sax.; although modern English has in this matter followed the classic mythology, in which Phœbus and Sol are gods; and Selene, Luna, and Diana, are goddesses; Grimm ("Deutsche Mythologie" p. 663) quotes an old invocation to the "New Moon, gracious lord" (Neuer Mon, holder herr), for increase of wealth; and down to recent times the German people were fond of speaking of "fräi sonne," and "herr mond" ("lady sun," and "lord moon"). The same inversion (as it appears to us) of gender is found among the Lithuanians and Arabians, and even the ancient Mexican Mexitli (moon) was masculine. Among the Slaves, according to Grimm, the moon is mas., a star fem., and the sun neut. In Hindu Mythology, also the moon—Chandra or Soma—is a male deity, represented by one myth as the son of the patriarch Atri, who procured him from his eyes, but by another, as arising from the milk-sea when it was churned by the gods for the attainment of the beverage of immortality. His wives are the 37 daughters of the patriarch Daksha, known as the nymphs of the lunar constellations. By one of them, Rohini, he had a son Budha (not to be confounded with Buddha), the regent of the planet Mercury, who begot on Ilā, a son, Purāṇavaś, who became the ancestor of a royal family, hence called the lunar dynasty.—The moon is generally represented as wearing white garments, with a mace in one hand, and riding in a chariot drawn by ten horses or antelopes. The animal sacred to him is the hare (the Hindus believing that an outline like that of a hare is visible on the moon); and the plants under his special patronage are a certain variety of the lotus, which

flowers when the moon rises, and the Soma plant, or *Asclepias acida*. As the receptacle of the beverage of immortality, he is thus described in the Vahn'n-Purâ'u'a: "The radiant sun supplies the moon, when reduced by the draughts of the gods to a single digit, with a single ray; and in the same proportion as the ruler of the night is exhausted by the celestial, it is replenished by the sun....; for the gods drink the nectar accumulated in the moon during half the month; and from this being their food they are immortal: 33,000, 3300, and 33 divinities drink the lunar nectar. When two digits remain, the moon enters the orbit of the sun, and abides in the ray called Amâ.... In that orbit, the moon is immersed for a day and night in the water, thence it enters the branches and shoots of the trees, and thence goes to the sun.... When the remaining portion of the moon consists of but a 16th part, the manes approach it in the afternoon, and drink the last portion, that sacred digit which is composed of nectar.... In this manner the moon, with its cooling rays, nourishes the gods in the light fortnight (or the 15 days of the moon's increase), the manes in the dark fortnight (when in the wane); vegetables, with the cool nectary aqueous atoms it sheds upon them; and through their development it sustains men, animals, and insects, at the same time gratifying them by its radiance."

**MOON, Mountains of the.** The "Mountains of the Moon" have ever played an important part in the history of African geography, and have given rise to many curious hypotheses. Ptolemy, and until lately, many of the ablest geographers, supposed that a very high chain of mountains crossed the continent of Africa from east to west; and they have continued to shift these mountains from one latitude to another, ranging from 10° north to 10° south, but still keeping them within nearly the same meridional bounds. Dr Beke, from his own researches and a minute study of the geography of Eastern Africa, propounded the theory, that the so-called Mountains of the M. run from north to south parallel to the coast of Zanzibar, instead of from east to west; forming, in fact, a continuation of the great Abyssinian table-land, and embracing the snow-capped mountains of Kenia and Kilimandjaro, which have an altitude of 20,000 feet.

The mass of mountains discovered by Captain Speke in 1858, round the head of Lake Tanganyika, is considered by him, both from its crescent form and its position, to be part of the Mountains of the M. of Ptolemy; but mountains of this height (6000 to 10,000 feet) could never be snow-clad so near the parallel of the equator.

**MOONJAH, Munjah, or Moonyah** (*Saccharum Munja*), a grass of the same genus with the sugar-cane, a native of India, the leaves of which afford a useful fibre, of which ropes are made. The M. grows in vast abundance in the neighborhood of the Ganges, Indus, and other rivers. The fibre of the M. is very tough and strong. No proper trial seems yet to have been made of the qualities of the M. fibre, more carefully prepared; but considering the facility with which it could be obtained in any desirable quantity, it seems to deserve attention.—Very similar to the M. is the **SARA** or **SHUR** of Bengal (*Saccharum Sara*), another species of the same genus, the leaves of which are employed in the same way.

**MOONSTONE.** See **FELSPAR**.

**MOORE, John, M.D.,** a Scottish physician and miscellaneous writer, son of the Rev Charles Moore, an Episcopalian clergyman, was born at Stirling, in 1730. Educated at the university of Glasgow, he began the study of medicine and surgery under Dr Gordon, surgeon of that city, which study he followed up in Holland, London, and Paris, and then, as the partner of his old master, Dr Gordon, began to practise in Glasgow. As medical attendant to the Duke of Hamilton, he spent five years in travelling on the continent, and on his return in 1778, settled in London. In 1779, he published "A View of Society and Manners in France, Switzerland, and Germany" (Lond. 2 vols. 8vo). In 1781, appeared "A View of Society and Manners in Italy" (2 vols. 8vo); in 1786, his "Medical Sketches," in two parts; and in 1789, "Zeluco," a novel (2 vols. 8vo)—the principal, or, at anyrate, the most popular of his works. His other works are—"A Journal during a Residence in France," 1792 (2 vols. Lond.), descriptive of scenes witnessed while at Paris in the autumn of that year as medical attendant of the Earl of Lauderdale; "A View of the Causes and Progress of the French Revolution" (2 vols. Lond. 1795); "Edward," a novel (Lond. 1796); and "Mordaunt," a novel (Lond. 1800, 3 vols. 8vo). He also edited a collected

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edition of Smollett's works, with a life of the author. He died at Richmond in Surrey, Feb. 20, 1802.

**MOORE**, Sir John, English general, born at Glasgow, 1761, was eldest son of the preceding. He entered the army as ensign when only 15, and served with distinction in Corsica, as colonel; in the West Indies, as brigadier-general; in Ireland, during the rebellion of 1798, and in the expedition to Holland, as a general of staff. He was in Egypt with the army under Abercromby, and obtained the order of the Bath for his services in command of the reserve. When war again broke out in 1802, M. served in Sicily and Sweden. In 1806, he was sent with a corps of 10,000 men to strengthen the English army in the Peninsula. He arrived in Mondego Bay, August 19, and assumed the chief command on the return to England of Sir H. Burrard. In October he received instructions to co-operate with the forces of Spain in the expulsion of the French from the Peninsula. He moved his army from Lisbon, with the intention of advancing by Valladolid, to unite himself with the Spanish general Romana, and threaten the communications between Madrid and France. But the apathy of the Spaniards, and the successes of the French in various parts of the Peninsula soon placed him in a critical position. Yet he had determined to make a bold advance from Salamanca to attack Soult, when the news reached him that Madrid had fallen, and that Napoleon was marching to crush him at the head of 70,000 men. M.'s forces amounted to only 25,000 men, and he was consequently forced to retreat. In December, he began a disastrous march from Astorga to Coruña, a route of near 250 miles, through a desolate and mountainous country, made almost impassable by snow and rain, and harassed by the enemy. The soldiers suffered intolerable hardships, and arrived at Coruña in a very distressed state. It was impossible to embark without fighting, and Soult was in readiness to attack as soon as the troops should begin to embark. The battle was mainly one of infantry, for the cavalry, after destroying their horses, had gone on board, and the bulk of the artillery, for which the ground was not adapted, had also been withdrawn. On the 16th January 1809, the French came on in four strong columns. A desperate battle ensued. While animating the 42d Regiment in a brilliant charge in an early stage of the action, M. was struck by a cannon-ball on the left shoulder, and died in the moment of victory. The French were defeated with the loss of 2000 men; and the funeral obsequies of the deceased soldier were performed with melancholy solemnity just before the embarkation of his troops. The British army in this expedition lost their magazines and 6000 soldiers. A monument was erected to M.'s memory in St Paul's Cathedral.

**MOORE**, Thomas, the son of a small tradesman, who, through the influence of Lord Moira, afterwards became a barrack-master in the army, was born in Dublin on the 28th May 1779. At an early age, he was placed at a school in which Sheridan had formerly been a pupil. In 1798 he was sent to the Dublin University, where he ultimately took the degree of B.A. Before entering the university, he had written verses for a Dublin magazine; and while there, he translated the "Odes" of Anacreon, in the hope of obtaining a classical premium, in which, however, he was disappointed. In Dublin he acquired Italian and French, and being fond of music, he learned to play on the piano—an accomplishment which was of service to him in his future career.

In 1798, with his translation of Anacreon in his pocket, he came to London to study law, and entered himself in the Middle Temple. In 1800 he published his translations, dedicated to George IV., then Prince of Wales. In 1802 he produced his "Poetical Works of the Late Thomas Little"—a volume of sweet but licentious verse, which was a good deal blamed and very widely read. In 1803, through the influence of Lord Moira, he was appointed to a government post at Bermuda. He arrived there in January 1804; but finding his situation disagreeable, he committed his duties into the hands of a deputy, and travelled in America previous to his return to England. His transatlantic experience seems to have cured him of the democratic ideas which he had imbibed in Dublin. On his return to England he published "Odes and Epistles," for which he was sharply taken to task in the "Edinburgh Review." A duel between himself and Jeffrey was the consequence—over which Byron made so much mirth—and which resulted in the combatants becoming the

most excellent friends. In 1807 he engaged with Mr Power to produce the "Irish Melodies," and on this work he was engaged at intervals up till 1834. In 1811 he married, and shortly after he went to reside in Derbyshire, where in 1813 he produced "The Twopenny Post-bag," full of brilliant fancy—in which the tropes not only glittered but stung.

As up to this time he had produced nothing but fugitive pieces, he became anxious to emulate his brethren, who wrote long poems and published in quartos. He fixed on an oriental subject, and the Messrs Longman agreed to purchase the poem for 3000 guineas. In 1817 the long expected "Lalla Rookh" appeared—brilliant as a firefly, and the whole English world applauded. After the publication he went to Paris, where he wrote "The Fudge Family," which appeared in 1818. At this time he learned that his deputy in Bermuda had misconducted himself, and that he had become liable for a large sum, which was afterwards, however, considerably reduced. Lord Lansdowne paid the claim, and M. repaid his lordship afterwards.

In 1819, M. went to Paris with Lord John Russell, and extended his tour to Italy, and saw Lord Byron at Venice. He returned to Paris, where he brought his family, and fixed his residence till 1822. Here he wrote "The Loves of the Angels," which appeared in 1823, and "The Epicurean," a prose romance, which was not published till 1827. On his return to England, he fixed his abode at Sloper-ton Cottage, near Bowood, and issued the "Memoirs of Captain Rock" in 1824, and the "Life of Sheridan" in 1825.

Byron had handed over to M., for his own especial benefit, a manuscript autobiography, on the condition that it should not see the light till after its author's death. Byron died in 1824, and as, at the request of his lordship's relatives, the manuscript was destroyed, M. then entered into arrangements with Murray to produce a life of the deceased poet. The "Life of Lord Byron" was published in 1830 in two volumes. Next year, he published the "Life of Lord Edward Fitzgerald." His last important work was a "History of Ireland," published in "Lardner's Cyclopaedia." A pension of £300 per annum was conferred on him in 1835. In 1841, he brought out an edition of his entire poetical works. For the three years preceding his death, he was afflicted with softening of the brain. He died on the 25th February, 1852. His friend, Lord John Russell, published his "Memoirs, Journal, and Correspondence," in 8 volumes (1852—1856).

Despite his popularity during his lifetime, M. can hardly be placed in the rank of great poets. His muse is a spangled dancing-girl—light, airy, graceful, but nothing more. His most ambitious work, "The Loves of the Angels," is far beneath the Miltonic, or even the Byronic standard. "Lalla Rookh" is brilliant, but fatiguing. He is most successful in polished satire and the lighter sentiments; and his reputation will ultimately rest on "The Twopenny Post-bag" and the "Irish Melodies."

**MOORFOWL**, Red Grouse, or, in books of natural history, Red Ptarmigan or Brown Ptarmigan (*Lagopus Scoticus*), a bird peculiar to the British Islands, and affording more amusement to sportsmen than any other kind of feathered game in Britain. It is the bird generally known in Britain by the name *Grouse*, although not a true species of Grouse, but rather of Ptarmigan (q. v.). The toes are completely feathered, as well as the legs; the bill is very short, and its base much concealed by feathers. The length of the M. is about sixteen inches, of which about four inches belong to the tail. The tail is nearly square. The wings are short. The plumage is of a deep chestnut-brown color, marked on the back and wing-coverts with black spots, and on the under-parts with undulating black lines; the four middle tail-feathers are also marked with transverse black lines. Above the eye is a naked space (the cere), of a bright scarlet color. The M. is plentiful in the moors of Scotland and the Hebrides, Wales, the north of England, and Ireland. It feeds on the tender tops of heath, crowberries, bilberries, &c.; and not unfrequently visits the fields of oats and other grain in the vicinity of the moors, particularly when the *stocks* remain long in the field in late and rainy harvests. The M. is not polygamous, and pairs in spring, when the plumage—particularly of the male—assumes a lighter and redder tint. The female lays from eight to fifteen eggs. The nest is on the ground, often under shelter of a tuft of heath. The young run about very soon after they are hatched. "Grouse" remain in *coveys* (broods) from the time they are hatched till late in the autumn, after which they "pack" or assemble in large

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bodies.—A cream-colored variety of *M.* is sometimes found in the north of England.—The *M.* is easily domesticated, and breeds readily in an aviary, if supplied with heath for food.

**MOORHEN.** See **GALLINULE**.

**MOORING** (allied probably to Dutch *marren*, to delay, fasten; Eng. *marine*, for fastening the sail to the bolt-rope; Lat. *mora*, delay), a fastening to retain a ship in a given position. This may be either by her own anchors, or (which is the more common meaning of the term) by fixed and permanent buoy, which, on its part, is anchored to the bottom. A chain-moorings is where a strong chain is stretched for some distance on the bottom, being securely anchored or otherwise made fast at each end, and perhaps in intermediate places. Numerous buoys are then floated from it, and it becomes the mooring-ground for many vessels. Chain-moorings are frequent in all large harbors where comparatively small vessels require to ride.

**MOORISH ARCHITECTURE.** See **ARABIAN ARCHITECTURE**.

**MOORS** (Lat. *Mauri*, meaning dark; Spanish, *Moros*) are a people who form the great majority of the population of Barbary. Their appearance indicates their origin, which is a mixture of the Mauri (from whom they derive their name), Numidians, Phœnicians, Romans, and Arabs, who have successively held possession of the country. In consequence, they are found to vary considerably in appearance and character in different parts of Barbary, but all shew more or less strongly the symptoms of a considerable infusion of Arabian blood. They are a well-formed race, with fine oriental features, and a mild and melancholy expression of countenance. They are more friendly and sociable than the Bedouins and Berbers, who inhabit the deserts and mountains; but are inferior to them in mental ability, besides being voluptuaries and cruel. They constitute, generally speaking, the tradesmen, artisans, merchants, and agriculturists of Barbary; but a considerable number lead a pastoral life. The dress of the *M.* consists of a piece of woollen cloth, five ells in length by one and a half in breadth, called a "haïque," which is thrown over the shoulders and fastened round the body; it also serves as a covering by night. This, when supplemented by a pair of slippers, a red cap, and a hood, constitutes the sole habiliment of the people generally. In the towns, the "caftan" is generally worn over the haïque. The *M.* employ the Arabic language, but with many corruptions and deviations from the original, and these appear to increase towards the west.

As the Arab conquerors of Spain invaded that country from Africa, where they had largely recruited their forces, they were naturally enough called Moors, and in Spanish history the terms Moors, Saracens, and Arabs are synonymous. From this mixed Moorish-Arab race sprung the *Moriscos*, who were permitted by Ferdinand the Catholic to remain in Spain after the expulsion of their countrymen, on condition of their embracing Christianity. A cruel persecution, which was originated by Philip II., drove them to rebellion (1567–70), and in 1571, many emigrated to Africa; those who remained being, to the number of 500,000, expelled in 1610 by Philip III.

The *M.* first appear in modern history as the allies of the Vandals in their invasion of Africa, and were continually rebelling against the Byzantine emperor. They were next, after a severe struggle, conquered and converted by the Arabs in 707. In 1091, they were summoned by the latter into Spain, to aid in stemming the tide of Christian conquest; and after faithfully supporting the Arab calif of Cordova, &c., till his dominions fell into the hands of the king of Leon and Castile, they retired, in 1238, to Granada, where they founded their kingdom. The kings of Granada carried on a vigorous, and, at the same time, chivalrous warfare with the kings of Castile; but at length, weakened by internal discord, were compelled to succumb to Ferdinand the Catholic in 1492. The *M.*, or at least that portion of them who refused to adopt Christianity, were then expelled from Spain, and, in revenge, founded in 1518 the piratical states of Algiers and Tunis. Their subsequent history cannot be separated from that of Algiers, Tunis, and Morocco.

**MOORUK** (*Casuarus Bennettii*), a recently discovered bird of the same genus with the Cassowary (q. v.), of which it was at first regarded as a mere variety, a na-

tive of the island of New Britain. It is about five feet in full height, three feet to the top of the back, is of a reddish color, mixed with black, and has a horny plate instead of a helmet-like protuberance on the top of the head. The claw of the inner toe of each foot is very long. It becomes extremely tame and familiar in captivity; may be fed on potatoes, maize, or any similar food; and is apt to prove troublesome by swallowing anything, however indigestible, that may come in its way.

**MOOSE.** See **ELK.**

**MOQUE'GUA**, a town of Pern, capital of a province of the same name, 68 miles north-west of Tacna, on the great route west of the Cordilleras. In the province are many large vineyards, which produce great quantities of wine and brandy. Pop. 9000.

**MO'RA** (Lat.) is a word often used in Scotch law to denote delay caused by negligence. In England and Ireland, the corresponding word is *Laches* (q. v.).

**MORA**, a genus of trees of the natural order *Leguminosæ*, sub-order *Cesalpiniceæ*, containing only one known species, *M. excelsa*, discovered by Sir R. Schomburgk, and described by him as the most majestic tree of Guiana. The timber is said to be equal to oak of the finest quality. It is already a considerable article of commerce, under the name of *Mora wood*. It is darker than mahogany. It is valued for ship-building.

**MORACEÆ**, a natural order of exogenous plants, or, according to many botanists, a sub-order of *Urticeæ* (q. v.). The *M.* are trees or shrubs with rough leaves and sometimes with climbing stems; they have a milky juice; the flowers are very small; the fruits of many flowers are often enclosed in a succulent receptacle, or the calyx becoming fleshy, all the fruits of a head or spike become combined into one. There are about 200 known species, natives of temperate and tropical climates. Some are valuable for their fruit, some for the caoutchouc obtained from their milky juice, and different parts of others are applied to various uses. Among the species are figs, mulberries, Osage orange, fustic, and contrayerva.

**MORADABA'D**, a town of British India, capital of a district of the same name, is situated on a slightly elevated ridge between the Ramgunga and the Ganges, 90 miles east-north-east of Delhi. There is a large jail, capable of holding 1800, for native convicts. West of the town, and separated from it by the jail, are the cantonments for the troops, agreeably situated amid luxuriant trees; the chief duty of the troops is to guard the convicts. Pop. (at census of N. W. Provinces, 1872), 62,417.

**MORAINÉ.** The masses of rock which, by atmospheric action, are separated from the mountains bounding the valleys along which glaciers flow, find a temporary resting place on the surface of the ice, at the margin of the glacier, and are carried along with it, but so slowly, that they form a continuous line along each margin. These lines of debris are called *lateral moraines*. When two glaciers unite, the two inner moraines unite also, and form one large trail in the middle of the trunk glacier, and this is called a *medial moraine*. A large portion of these rocky fragments at length reaches the end of the glacier, and here the melting ice leaves it as a huge mound, which is known as a *terminal moraine*. See **GLACIER**.

**MORA'LITIES.** See **MYSTERIES**.

**MORALS.** See **ETHICS**.

**MORA'NO**, a city of Southern Italy, in the province of Cosenza, built on a hill in a wild and rugged neighborhood, 85 miles north-north-west of Cosenza. Pop. 8350. It has good manufactures of silk, cotton, and woollen fabrics.

**MORAT** (Lat. *moratum*, Ger. *Murten*), a town of (1871) 2323 inhabitants, in the canton of Fribourg, Switzerland, on the Lake of Morat, about twelve miles from Bern, famous for the victory of the Swiss and their allies over Charles the Bold, Duke of Burgundy, June 22, 1476. The duke, exasperated by his defeat at Grandson, in March, appeared before the Gates of M., with 40,000 men. The Swiss were aided by Strasburg, Basel, Colmar, and other Rhenish cities, and by Duke René of Lorraine, whom the Duke of Burgundy had driven from his possessions; but the superiority of numbers was greatly on the side of the Duke of Burgundy. The

assault of the Swiss, nowever, was very impetuous, and their victory complete; the duke's camp fell into their hands, and he himself only escaped by the swiftness of his horse.

MORATÍN, Leandro Fernandez de, the most eminent comic poet that Spain has produced in recent times, was born at Madrid, March 10, 1760. His father, Nicolas Fernandez de Moratin, was also a poet of some eminence, but having found that literary labors afforded a precarious support, he wished his son to learn the trade of a jeweller, by which, after his father's death, he, in fact, for some time supported himself and his mother. In 1790, appeared his first and best comedy, "El Viejo y la Niña;" it was followed by "La Comedia nueva El Barón," "La Mogigata," and "El sí de las Ninfas." Prince Godoy conferred several ecclesiastical benefices upon him, though the Inquisition set its evil eye upon the poet. Joseph Bonaparte made him chief royal librarian; and after 1814, he took refuge in Paris. His last work was the "Origenes del Teatro Español." He died in Paris, June 21, 1828.

MO'RAVA, the chief river of Servia. It is formed by the union of two head streams—the eastern or Bulgarian M., which rises in the mountains to the south of the new southern frontier of Servia; and the western or Servian M., which rises on the western frontier. The united stream flows northward to the Danube, and has a total length of about 180 miles.

MO'RAVA, or, more properly, March (called by the ancients *Marus*), a river of Austria, has its origin on the southern slope of the Schneeberg, on the borders of Prussian Silesia, 3382 feet above sea-level. It is the chief river of Moravia, to which it gives its name, and flows south through that crown-land, receiving on the right the Thaya, and falling into the Danube, eight miles above Presburg. In its lower course, it forms the boundary between Lower Austria and Hungary. Its course is 184 miles in length, and it is navigable from Göding, upwards of 60 miles from its mouth.

MORA'VIA (Ger. *Mähren*), a crown-land of the Austrian empire, situated in 48° 40'—50° n. lat., and 15° 5'—18° 45' e. long. It is bounded n. by Prussian and Austrian Silesia, e. by Hungary and Galicia, s. by the duchy of Austria, and w. by Bohemia. The superficial area is about 8480 square miles; and the population in 1870 was 2,017,974.

M. is enclosed and traversed on all sides by mountains, being separated from Silesia by the range of the Sudetes; from Bohemia, by the Moravian chain; and from Hungary, by the Carpathian Mountains; while branches of these various chains intersect the whole country except in the south, where the land consists of extensive plains, lying about 800 feet above the level of the sea. The numerous small rivers of the interior follow a south-east direction; and fall into the March or Morava, from which the country derives its name, and then flow together with the latter into the Danube. The Oder, and its affluents the Elbe and Oppa, rise among the mountains on the north-east, from whence their course is soon turned directly away from the Moravian territory. There are few extensive lakes, but numerous ponds and small streams, which abound in fish. The more elevated parts of the country are not fertile, and the climate is severe; but in the mountain valleys and on the southern plains, the soil is remarkably rich, and the temperature more genial than in other European countries lying in the same parallel. M., which ranks as one of the richest of the Austrian dominions, has half of its area in arable land. It yields fine crops of grain, and among the other natural products grown for exportation, we may instance hops, mustard, potatoes, clover-seed, beet-root; and in the south maize, grapes, chestnuts, and many other of the less hardy fruits and vegetables. The breeding of cattle and sheep, and the making of cheese from sheep's milk, constitute an important branch of industry; in the southern districts of the Hanna (a plain famous for its fertility), horses are bred for exportation. Geese and fowls are reared in large numbers for the sake of their feathers, and the keeping of bees is conducted with great success. The mineral products include iron, alum, saltpetre, coal, graphite, whetstones, sulphur, vitriol, pipe-clay, marble, and topazes, garnets, and other precious stones.

*Industry, &c.*—The principal branches of industry are the manufacture of linen and thread, which now enjoy a European reputation, and those for cotton goods at

Sternberg. M. has long been noted for the excellence of its cloths, flannels, and other woollen fabrics, and for its leather goods. The minerals of M., especially coal and iron, are important, and are extensively wrought. Beet-sugar is largely manufactured. Brünn (q. v.), the capital, is the chief emporium for the manufacturing trade, and Olmütz (q. v.) the principal cattle-mart.

The educational wants of the province are provided for by 12 gymnasias and about 1900 schools. The former university at Olmütz is now represented by a theological faculty, and by a large technical institute. The majority of the people belong to the Church of Rome. There are about 50,000 Protestants and 40,000 Jews.

In regard to nationality, the population may be divided as follows: About 500,000 Germans, nearly a million and a half of Slavs, and 50,000 belonging to other races (including Jews). The Slavs of M. are mostly Czechs, with Poles and a few Croats. The Czechs are inferior in all respects to their brethren in Bohemia. The Moravian Poles, although inferior to the Germans as regards industry and cultivation, are a physically well developed, courageous, and enterprising people.

*History.*—M. was anciently occupied by the Quadi, who, on their migration in the 5th c. to Gaul and Hispania, were replaced first by the Rugii, next by the Heruli and Lombards, and finally by a colony of Slavonians, who, on their settlement in the country, took the name of Moravians, from the river Morava. Charlemagne, who brought the people under nominal subjection after they had spread themselves over a territory greater than the present M., constrained their king, Samoslav, to receive baptism; but Christianity was first formally established in the middle of the 9th c. by Cyril, who must be regarded as the true apostle of the land. M. was made tributary to the German empire before the close of the century; but in 1029, it was incorporated with Bohemia, after having for a time been a prey to the incursive attacks of its Slavonic and Teutonic neighbors. At the close of the 12th c., M. was erected into a margraviate, and declared a fief of Bohemia, to be held from the crown by the younger branches of the royal House. On the death of Lewis II. at the battle of Mohacz in 1526, M., with all the other Bohemian lands, fell to Austria, in accordance with a pre-existing compact of succession between the royal Houses. Since then, it has shared the fortunes of the empire, and in 1849 it was formally separated from Bohemia, and declared a distinct province and crownland.

**MORAVIANS** (called also *United Brethren*, *Moravian Brethren*, or *Bohemian Brethren*), a religious community, tracing its origin to the followers of John Huss, who were expelled by persecution from Bohemia and Moravia in the beginning of the 15th c., and of whom a small company, consisting at first of only ten persons, received permission from Count Zinzendorf (q. v.), in 1722, to settle on his estate of Berthelsdorf, in Saxony. To this settlement they gave the name of Herrnhut, whence they are commonly known in Germany as Herrnhuters. It rapidly increased, not only by the accession of additional Bohemian and Moravian refugees, but also of other Christians, who were attracted by the faith and piety which remarkably prevailed in it. Zinzendorf joined the little brotherhood, devoted his whole estate to the propagation of Christianity, and undertook the work of the ministry. The doctrines which they received being those of the Augsburg Confession, it was proposed that they should unite themselves with the Lutheran Church; but a difference of opinion existing on this point, it was decided, as difficult questions still sometimes are among the M., by an appeal to the lot; and the result was, that the *United Brethren*, or *Unitas Fratrum*, as they termed themselves, remained a distinct community, and adopted an organisation of their own. Till Zinzendorf's death in 1760, he was really their leader, and was recognised by them as *Ordinarius*. After his death, their organisation was completed by synods held in 1764 and 1769.

The M. are recognised by the state in Germany, as Protestants attached to the Augsburg Confession. They have no symbolical books of their own, although they drew up a simple and brief confession of their faith in 1727, and a brief statement of principles was emitted by a synod held in 1775.

The M. profess to be connected with the Bohemian or Moravian Brethren of former times by a regular succession of bishops. The bishops, however, exercise no episcopal authority, and their chief peculiar function is that of ordination, of which they alone have the power. Every congregation is governed by a *Conference of Elders*. The elders are bound to visit each family once in three months, and to report concerning the maintenance of family worship, and the conduct of the brethren.



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It is also their duty to visit the sick, and to aid the poor with money contributed by the other brethren. The whole church is governed by synods, which meet—always in Germany—at intervals of ten or twelve years, and are composed not only of bishops, but also of other members of the brotherhood. Between one synod and another, all affairs are managed by a *Conference of Elders* appointed by the synod.

M. are to some extent scattered amongst the general population of the countries in which they dwell, as Britain and America; but they prefer, where it is possible, to live in colonies, or separate societies, and in these they carry out some very peculiar parts of their organisation, particularly a division into *choirs* of children, youths, maidens, unmarried brethren, unmarried sisters, widowers, and widows, each having a separate leader or pastor. Unmarried brethren, unmarried sisters, widowers, and widows, reside in separate houses; married couples in houses of their own. Colonies of M. exist in England, America, Holland, and other countries, but are most numerous in Germany. The most important colonies, however, are perhaps those in the mission-fields. The Brethren early entered on missionary work, and all the prosperity of their church has been evidently connected with their earnest prosecution of it. Their first mission was planted, in 1733, in the island of St Thomas, in the West Indies; the missionaries who went thither expressing their resolution to become slaves, if necessary, in order to carry out their purpose. A mission to Greenland, which has been eminently successful, and may be said to have made Greenland a Christian country, was commenced in 1733. They have also interesting missions in Labrador and at the Cape of Good Hope, and in other heathen countries. The M. have at their mission-stations about 70,000 converts from heathenism. One of the most interesting of their stations is at Sarepta, in the government of Saratov, in Russia, by which they are connected with the Tartars and Kalmycks. In all their settlements, the education of the young receives the utmost attention.

The religious services of the M. are conducted with great simplicity. They meet for worship daily, in the evening, the service being much like that of a *prayer-meeting* amongst other Christians. They use a litany on the Lord's Day, but extemporary prayer is frequent. They admit the use of instrumental music. They maintain the practice of washing the feet, both in choirs and in congregations, before the communion. They meet on the last day of the year, to bring in the New Year with prayer and other exercises of religion. On Easter morning, they assemble in the burying-ground to celebrate the resurrection of Christ, and to express their confidence concerning the brethren who have died during the preceding year. The death of a member of the brotherhood is made known in the chief settlements by sound of trumpet, as if for victory; the melody indicating the particular choir to which the deceased belonged. In some of the settlements peculiar dresses are worn by the members of particular choirs.

In 1875, there were in Europe 63 congregations of M., with 9131 communicants; and in America, 75 congregations, with 8315 communicants. Seventeen bishops were living in 1875, of whom 6 were in the United States. There were 92 mission stations, with 333 missionaries, and above 1000 native assistants, having the care of 59,843 communicants.

**MORAY FIRTH**, an indentation of the German Ocean, on the north-east coast of Scotland. Its north-west shore is formed by the counties of Ross and Cromarty, and extends from Kessock Ferry, opposite Inverness, to Tarbet Ness. Its south-east shore extends from Inverness to Burghhead, in Elginshire. The entrance of the firth between Burghhead and Tarbet Ness is 16 miles in width; and from its entrance to Inverness it is 81 miles in extent. The firth is continued westward from Inverness by a branch called Beaulieu Basin.

**MORAYSHIRE.** See **ELGINSHIRE**.

**MORBID APPETITES** may consist of a desire which is, in character, natural and necessary to the animal economy, but becomes unhealthy when excessive and irresistible. Of this, the hunger which attends marasmus, and the thirst which attends diabetes, may be cited as illustrations. They may consist further, in a craving for articles or objects not in reality deleterious or detrimental, but which do not constitute the ordinary gratification of the appetite, such as the desire for chalk and lime experienced by chlorotic and hysterical women. They may, thirdly, consist

in the longings, often complicated with delusions, felt by pregnant women and others, which are injurious, repugnant to nature, and revolting. Georget gives an instance where a wife coveted the shoulder of her husband, killed him in order to obtain the morsel, and salted the body in order to prolong the hideous cannibalism. In such a case, the gross longing may be said to constitute the disease; but there are others in which it is one of many symptoms demonstrating the degradation of the mind under general disease, as when the insane devour garbage, excrement, or swallow grass, hair, stones.—Georget, "Dict. de Médecine;" Feuchtersleben, p. 276.

**MORBIHAN**, a maritime department in the north-west of France, formed out of ancient Bretagne. Area, 2615 sq. miles; pop. (1876) 506,573. The coast is much indented, and has a multitude of bays, roadsteads, harbors, and islands. The largest island is Belle Isle (q. v.). The department has a somewhat hilly appearance, but towards the sea, the land stretches out in rich plains, interrupted, however, by great tracts of heath and marsh. The climate is mild, but moist. The soil is not well cultivated, but yields sufficient grain for home consumption. The heaths afford fine pasturage, and support great herds of horned cattle, sheep, and horses. The rearing of bees is a source of very considerable revenue; as also are the river and coast fisheries. The trade in sardines is particularly extensive. The want of wood is so great, that the peasants are obliged to burn dung extensively. The chief mineral is iron, but there are almost no manufactures. M. is divided into the four arrondissements of Vannes, L'Orient, Ploermel, and Pontivy. The chief town is Vannes (q. v.), but the most populous is L'Orient (q. v.).

**MORDANTS.** See DYING.

**MORDAUNT**, Charles, Earl of Peterborough, military and naval commander, and one of the most brilliant Englishmen of his time, was the son of John Lord Mordaunt, and was born in 1658, some say 1662. He served as a boy in the navy, and then entered the army. He took part against James II., and was made Earl of Monmouth by William III., succeeding afterwards to the earldom of Peterborough, as heir to his uncle. During the war of the Spanish Succession, the English government determined to send an expedition to Spain. It was placed under the command of M.; and in June 1706, he arrived in Lisbon with 5000 Dutch and English soldiers. After taking on board the Archduke Charles of Austria, who claimed the Spanish crown, the armament proceeded to Valencia. Here M., with characteristic daring, conceived the idea of making a dash at Madrid, and finishing the war at one blow. He was overruled by the archduke and the Prince of Hesse, and compelled to besiege Barcelona, which was defended on one side by the sea, and on the other by the strong fortifications of Montjuich. By a *coup de main*, he made himself master of Montjuich. Barcelona fell, and M., with a handful of men, entered one of the strongest cities of Europe. He pushed his successes into the interior. Several towns submitted. He marched to Valencia in the depth of winter, and at the head of 1,200 men defeated a Spanish force of 4000. The Spaniards sent a large army into Catalonia, and a French fleet appeared off Barcelona. M. harassed the enemy's army, and putting himself on board the English squadron, directed a movement which, had it been executed a few hours earlier, would have resulted in the capture of the whole French fleet. The Frenchmen put to sea, and Barcelona was saved. M. again wished to march towards Madrid, but his plan for gaining possession of the capital was once more rejected by Charles. He accordingly left the army in a fit of pique, and went to Italy. In 1707, he returned to Valencia, as a volunteer, and gave excellent advice, which was not followed. He was recalled to England, and from that moment the tide of fortune ran strong against the Austrian cause. Few generals have done so much with means so small, or displayed equal originality or boldness. His fertility and activity of mind were admirably seconded by a most intrepid spirit. His splendid talents, on the other hand, were disfigured by vainglory, and a morbid craving for novelty and excitement. He loved to fly round Europe, and was said to have seen more kings and postillions than any other man of his day. On his return, he made common cause with the Tories, to spite the Duke of Marlborough, and received the Garter and other dignities for his services. On the accession of George I., he was appointed commander-in-chief of the naval forces of Great Britain; but was never again employed in active service. He died at Lisbon 25th October 1785. His witty, yet affectionate letters to Pope, Swift, Prior &c., give a

fine insight into his private character. See Elliot Warburton's "Memoir of Charles Mordaunt, Earl of Peterborough and Monmouth, with Selections from his Correspondence," 2 vols. (1853). His character has been sketched by Horace Walpole, in his "Catalogue of Royal and Noble Authors;" and with still greater force and picturesqueness by Macaulay.

MORE, Sir Thomas, Lord Chancellor, and one of England's worthiest sons, was born in Milk Street, London, in 1478, son of Sir John More, Justice of the Queen's Bench. He was educated at St Anthony's School, Threadneedle Street; and in his fifteenth year was placed in the house of Cardinal Morton, Archbishop of Canterbury, who used to say of him: "This child here waiting at the table, whosoever shall live to see it, will prove a marvellous man." Dean Colet, too, was wont to say: "There was but one wit in England, and that was young Thomas More." In 1497, M. went to Oxford, where he made the friendship of Erasmus. He then applied himself to the law, and studied first at New Inn, and afterwards at Lincoln's Inn. He was appointed reader at Furnival's Inn, where he lectured for three years. At the accession of Henry VIII., his professional practice was considerable, and he also held the office of judge of the Sheriff's Court in the city—his income from these sources being equivalent to £4000 or £5000 of our present money. He went on several missions abroad for the king, and in 1516 was made a privy-councillor. His public life now began. He became so great a favorite with Henry VIII., that, in the words of Erasmus, "the king would scarcely ever suffer the philosopher to quit him." Henry visited him uninvited at Chelsea, and walked with him by the hour in his garden, "holding his arm about his neck." Yet M. had a true insight into Henry's character, for being congratulated on the king's favor by his son-in-law, Roper, he replied: "If my head would win him a castle in France, when there was war between us, it should not fail to go." M. is the first person in British history distinguished by the faculty of public speaking, and remarkable for the successful employment of it in parliament against a lavish grant of money to the crown. Being elected Speaker of the House of Commons in 1523, he vindicated the ancient liberties and privileges of the house against Cardinal Wolsey, who rather feared than liked him. In 1529, when the prosecution was opened against Wolsey, the king delivered the Great Seal to M. at Greenwich, constituting him Lord Chancellor, a dignity that had generally been held by ecclesiastics, and had never yet been filled by a common lawyer. When he was seated in his Court of Chancery, his father, Sir John More, who was nearly ninety, was the oldest judge of the King's Bench. It was a beautiful spectacle to "see the son ask the blessing of the father every day upon his knees, before he sat upon his own seat." Unlike the haughty Wolsey, whom no suitor could approach without offerings, M. sat daily in an open hall, that he might receive in person the petitions of the poor. He despatched the causes so speedily and diligently, that on asking for the next, he was told that none remained. Henry in vain endeavored to obtain M.'s authority for his divorce with Catharine of Aragon, and his marriage with Anne Boleyn, upon which he had set his heart. As soon as the progress of the marriage was so far advanced that the active co-operation of a chancellor was required, M. obtained leave to resign the great seal. When the king "by no gentleness could win him," his favor turned to fury. M. refused to take an oath which pledged him to the lawfulness of the king's marriage with Anne Boleyn. He was committed to the Tower, where he remained thirteen months. On the 6th of May 1535, he was brought to trial at Westminster. It has been truly said that "no such culprit had stood at any European bar for a thousand years." He was convicted by the most flagrant perjury and injustice, and sentenced to the savage punishment for high treason. He suffered death in the Tower, July 6, 1535. In the words of Addison: "The innocent mirth which had been so conspicuous in his life did not forsake him to the last. When he laid his head on the block, he desired the executioner to wait until he had removed his beard, 'for that had never offended his Highness.'" His head was placed on London Bridge, but was taken down and preserved by his favorite daughter, the admirable Margaret Roper, the story of whose tenderness and devotion will live as long as the English language endures. His "Utopia" is the conception of an imaginary commonwealth, in which opinions are expressed of great boldness and originality, and especially favorable to freedom of inquiry, even in religion. He, however, wrote against the Lutherans, and corrected the MS. of Henry's answer to Luther. The terseness and liveliness of his sayings,

his sweet temper and affectionate disposition, his blameless life, his learning and probity, combine to make a union of perfect simplicity with moral and intellectual greatness, which will for ever endear his memory to his countrymen of every sect and party.

MORE, Hannah, the daughter of a village schoolmaster, near Bristol, was born in 1745. She wrote verse at an early age; and in 1778, she published a pastoral drama entitled "The Search after Happiness;" and the year after, her tragedy of "Regulus." Under the idea that she was possessed of dramatic talent, she was introduced to Garrick, and through him became acquainted with Dr Johnson, Burke, and Sir Joshua Reynolds. Deeply impressed with the importance of religion, she gradually resigned her ambition to shine as a writer for the stage, and after the publication of her "Sacred Dramas," she retired to the country, and busied herself with the composition of works of a more serious and practical cast, the best remembered of which are, "Cecilia in Search of a Wife," and "The Shepherd of Salisbury Plain." She died at Clifton, on September 7, 1833. Her "Memoirs and Correspondence" were published in the following year, in four volumes.

MOREA, the name borne by the ancient Peloponnesus (q. v.) since the middle ages, if not from as early a period as the 4th century. It is usually said to be derived from *morua*, a mulberry—the outline of the peninsula bearing a resemblance to the leaf of that tree; others, however, such as Fallmerayer, trace it back to the Slavic word *morr*, the sea, which nearly encircles the Morea. The M. forms the most southern part of the kingdom of Greece, and is divided into the nomarchies of Argolis, Corinth, Laconia, Messenia, Arcadia, Achaia, and Elia.

Overrun by the Goths and Vandals, it became a prey in the second half of the 8th c. to bands of Slavic invaders, who found it wasted by war and pestilence. Gradually, however, these barbarians were subdued and Grecianised by the Byzantine emperors. Nevertheless, the numerous names of places, rivers, &c., in the M. of Slavic origin, prove how firmly they had rooted themselves, and that the Moreotes are anything but pure Greeks. In 1207, the peninsula was conquered by French knights, and Achaia was formed into a principality with all the feudal institutions of the west. After 1261, the Byzantine emperor, Michael VIII. Palæologus, reconquered part of the country; but the principality of Achaia remained in the family of Villehardouin till 1346, when the male line became extinct. Various claimants now arose, and much strife and confusion ensued. At length, in 1460, the greater portion of the M. fell into the hands of the Turks, who retained possession of it down to the period of the Greek revolution, except from 1657 to 1715, when it was held by the Venetians. The long struggle between the Turks and Venetians diminished the population so much that in 1719 it had only 200,000 inhabitants, and the plagues of 1756 and 1782 even reduced it to half this number. After the French Revolution, however, it began to increase; at the outbreak of the War of Independence, in 1827, it had reached 300,000, of whom only one-sixth were Turks; and in 1870, it was 645,889.

MOREAU, Jean Victor, the greatest general of the French Republic, except Bonaparte, was born, 11th August, 1763, at Morlaix, in Bretagne; was the son of an advocate, and was sent to study law at Rennes. He took the side of the Revolution, was chosen to command the battalion of volunteers from Rennes, served under Dumas in 1793, and displayed such military talent, that in 1794 he was made a general of division. His father was put to death by the guillotine under the Reign of Terror, and M. hesitated for a moment, but resolved that he could not withdraw from the service of his country. When Pichegru fell under suspicion, the Directory appointed M. in the spring of 1796, to the chief command on the Rhine and Moselle. He crossed the Rhine at Kehl, defeated Latour at Rastadt, and the Archduke Charles at Ettlingen, and drove the Austrians back to the Danube. But, owing to errors in the plan of the campaign against which he had in vain remonstrated with the Directory, M. found himself in danger of being cut off from the Rhine, and was obliged to make a desperate effort to regain that river, which he accomplished, notwithstanding great difficulties, by a march of forty days. This retreat established his reputation for generalship more than all his previous victories.

A suspicion of participation in the plots of Pichegru led to his being deprived of his command after the *coup d'état* of 18th Fructidor. In the following year he succeeded Schérer in the command of the army in Italy, when it was hard pressed by the

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Russians and Austrians, 25,000 men being opposed to 80,000. By a retreat conducted with consummate skill, and in course of which he even gained victories, he saved the French army from destruction. The Directory, nevertheless, deprived him of the chief command, and gave it to Joubert. But M. remained with the army, and aided that young general to the utmost; and after his death at Novi, again assumed the command, and conducted the defeated troops to France. The noble disinterestedness of M.'s character, his military talent, and his political moderation, induced the party which overthrew the Directory, to offer him the dictatorship of France, which he declined, and lent his assistance to Bonaparte on the 18th Brumaire. Receiving the command of the army of the Rhine, M. gained victory after victory over the Austrians in the campaign of 1800, and at last won the great and decisive battle of Hohenlinden (q. v.). A strong feeling of mutual distrust now arose between M. and Bonaparte, who sought in vain to win him to himself; and M.'s country-seat, to which he retired, became the gathering place of the discontented. Bonaparte surrounded him with spies, and ere long he was accused of participation in the plot of Cadoudal (q. v.) and Pichegru against the life of the First Consul. He was arrested, brought to trial, and found guilty on 10th June 1804, although the evidence against him was utterly insufficient. But Bonaparte could not venture upon a sentence of death, and a sentence of two years' imprisonment was therefore pronounced, which was commuted into banishment, and M. went to America, where he settled in New Jersey. Regarding with great dissatisfaction the whole of Bonaparte's further career, he thought it his duty to France to give his aid to the allies in the campaign of 1813, and leaving the United States in the company of a Russian agent, he landed at Gothenburg, had an interview with the Crown Prince of Sweden, the former General Bernadotte, and accompanied the emperor of Russia and the king of Prussia in the march against Dresden, where, as he stood with the Emperor Alexander on a height at Racznitz, on 27th August, a French cannon ball broke both his legs. Amputation was performed, but he died at Laun in Bohemia, 2d September 1813.

**MO'RECAMBE BAY**, an inlet of the Irish Sea, on the north-west coast of England, separates the main portion of Lancashire from the detached portion of Furness. It is about 10 miles in average breadth, and is 16 miles in length. It receives the Kent, the Keer, and the Lune. The depth of water in the bay is never great except in the channels of the rivers; and when the tide is out, the water entirely withdraws for the time, and there is a road, although a dangerous one, across the sands from the vicinity of Lancaster into Furness.

**MORE'N.** See **MOIRE**.

**MORE'L** (*Morchella*), a genus of fungi, of the division *Hymenomycetes*, having a statural stalk, and a roundish or conical *pileus*, the upper surface of which is divided into an irregular net-work of cells or pits, and bears the *hymenium*. They grow on the ground, and have a more or less agreeable smell and taste. Some of them are reckoned among excellent fungi, of which the best known is the **COMMON M.** (*M. esculenta*), a fungus rare in Britain, but common in many parts of the middle and south of Europe. Its stalk is only about an inch high, and it has a roundish, oval, oblong, or conical, yellowish or brown pileus. It is nutritious, and not difficult of digestion; but is chiefly used in sauces and gravies, on account of its pleasant flavor. It is used either fresh or dried, and is often brought to market in a dried state. It grows in lawns, and among fallen leaves in the thinner parts of woods where the soil is light, and makes its appearance in spring. It makes excellent ketchup. In Germany, the *M.* is highly prized, and as it very often springs up when part of a forest has been burned, the forests of Germany were often destroyed for its sake, till this practice was restrained by severe penalties. Its cultivation has not been attempted, although probably it would not be difficult.—A very similar species is *M. patula*, which is used in the same way; as is also the **BOHEMIAN M.** (*M. Bohemica*), which has a stem 4—8 inches high, and a thimble-shaped, obtuse, white-margined pileus, with longish narrow pits of many various forms; abundant in Bohemia, and when dried in a baker's oven, a considerable article of export. The name *M. (Morchel)* is extended in Germany to some of the edible species of *Helvella* (q. v.).

**MORE'LIA**, or Valladolid, a town of Mexico, capital of the state of Michoacan, in a fine valley, surrounded by high mountains, 125 miles west-north-west of Mexico.

There is a magnificent aqueduct for the supply of water. It was the birthplace of Iturbide, the short-lived emperor of Mexico. Pop. 25,000.

**MORELLA** (anc. *Castra Elicia*, the winter-quarters of Sertorius), a town and important fortress of Spain, in the province of Castellon, about 80 miles north of Valencia. M. was the chief stronghold of Cabrera, who scaled the castle by ropes furnished by a partisan within, on the night of the 25th January 1838. It was retaken in 1840 by Espartero, after a brave defence. There are some interesting Roman and Moorish antiquities. Pop. 6800.

**MORESCUE.** See **ARABESQUE**, **GROTESQUE**.

**MORETON BAY**, on the east coast of Queensland, Australia, is formed inside the islands of Moreton and Stradbroke, the former 23 miles, and the latter 35 miles in length, and both about 5 miles in greatest breadth. It is 65 miles in length (lat. 27°-37° S.) by 23 miles in greatest breadth. Its shores are rich in soil, and admirably adapted for agriculture. Its appearance is rendered picturesque and beautiful by the numerous islets, some of them capable of profitable cultivation, with which it is dotted over. Into this bay five navigable rivers, the Arrowsmith, Logan, Brisbane, Pine, and Caboolture pour their waters. The entrance at the north end is practicable at all times for vessels of the largest size; the entrance between Moreton and Stradbroke is narrow, and less safe.

**MORETON-BAY CHESTNUT** (*Castanospermum Australe*), a tree of the natural order *Leguminosae*, sub-order *Papilionaceae*, a native of Queensland, Australia. It attains a height of 70-100 feet, has wide-spreading branches, pinnate leaves, and large racemes of beautiful red and yellow flowers. The pods are six or seven inches in length, and the seeds are in size and quality somewhat like chestnuts.

**MORGAN, Lady** (Sydney), was the daughter of a theatrical manager, named Owens, who settled in Dublin. It is usually stated that she was born in 1786, but as she refuses to tell the date of her birth, "because dates are so cold, false, and erroneous," the reader of her autobiography will do well to add about ten years to her age. Her father fell into pecuniary difficulties, and the clever, bold, and lively young woman resolved to support the fortunes of the family, first as governess, and then as author. She wrote "The Wild Irish Girl" in 1806. A lady novelist was then rare, and Irish subjects were less hackneyed than they have since become. Sydney Owens obtained a footing in the household of the Marquis of Abercorn, in whose establishment her future husband, Dr Morgan, held the post of private physician. The Lord Lieutenant was persuaded to make a knight of Dr Morgan, and the newly wedded pair set up for themselves in Dublin. Here she wrote the "O'Donnel." The opening of the continent in 1814 attracted the Morgans to Paris. Lady M. obtained admission into the highest society, corresponded with several celebrities, and wrote a work on "France," which was eagerly received, and vehemently praised and censured by critics of different political opinions. In 1816, the Morgans went to Italy—the wife to sketch manners, scenery, and society, while Sir Charles was to contribute chapters on politics, science, and education. Lady M. was received with great hospitality by the Italian nobility, and the foreign visitors at Rome. Her "Italy" appeared in 1821, and proved one of the most successful and remunerative of her works. In 1824, the Morgans came to London, and in 1825, Lady M. began to keep a diary, which contains some amusing bits of literary, fashionable, and political gossip. Her reputation as an authoress became obscured, but she continued to the end of her career to assume the twofold character of the lady of fashion and the woman of genius. She succeeded in obtaining from the Whig government a pension of £300 a year, in acknowledgment of her literary merits, and partly, also, in recognition of the unjust and virulent attacks to which she had been subjected for having, in her earlier works, exposed the wrongs of her native country. She died in 1869, having continued busy with her pen and her tongue to the last; and leaving behind a great mass of correspondence of little intrinsic value and interest, which, with a memoir, her autobiography, and diary, was published in 1892, in 2 vols. Her descriptions of high life have much raciness and vigor, and her Irish sketches—the famous "Jug-day," in "The O'Briens and the O'Flahertys," deserving special mention—are perhaps the best account of that rascally, humorous, senti-

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mental existence which was at once the charm and bane of Ireland, and which has but lately passed away.

**MORGANATIC MARRIAGE** (Goth. *morggan*, to curtail, limit), sometimes called *Left-handed marriage*, a lower sort of matrimonial union, which, as a civil engagement, is completely binding, but fails to confer on the wife the title or fortune of her husband, and on the children the full status of legitimacy or right of succession. The members of the German princely houses have for centuries been in the practice of entering into marriages of this kind with their inferiors in rank. Out of this usage has gradually sprung a code of matrimonial law, by which the union of princes with persons of lower rank, in other than morganatic form, involves serious consequences, especially towards the lady. The penalty of death was actually enforced in the case of the beautiful and unfortunate Agnes Bernauer (q. v.). In the 16th and 17th centuries, a fashion began among German princes of taking a morganatic wife in addition to one who enjoyed the complete matrimonial status—Landgrave Philip of Hesse setting the example, with a very qualified disapprobation on the part of the leading reformers. An energetic attempt was made in the first half of the last century by Anton Ulrich, Duke of Saxe-Meiningen, to upset the established practice, and obtain for his morganatic wife the rank of duchess, and for her children the right of succession. In deference to the united opposition of the whole principedom of Germany, the emperor refused the duke's suit, declaring that there could be no marriage in princely families without "*Ebenbürtigkeit*," or equality of birth. In the present century, morganatic marriages are by no means on the decline among the German reigning houses—one of the best known and most remarkable instances being the union of the late Archduke John, the "*Reichsverweser*" of 1848, with the daughter of the postmaster of Aussee, in Styria, afterwards created Countess of Meran. Morganatic marriages are recognised not only among the princely families, but among the higher aristocracy of the empire; and in Prussia, even the "*Niedere Adel*," or inferior gentry, may contract unions of this kind. A sort of left-handed or "*hand-fasted*" marriage was recognised in early times in the Highlands of Scotland, and Ireland: the hand-fasted bride could be put away, and a fresh union formed, with the full status of matrimony. Unlike the case of German morganatic marriages, the issue were often accounted legitimate, even to the prejudice of the children of the more regular union that followed. The Royal Marriage Act, 12 Geo. III. c. 11, reduces to a position somewhat like that of morganatic unions every marriage in the royal family of Great Britain not previously approved by the sovereign under the Great Seal, provided the prince entering into it is under 25, and every such marriage of a prince above 25 which is disapproved by parliament.

**MORGA'RTEN**, a mountain slope on the east margin of Lake Egeri, in the canton of Zug, Switzerland, has acquired a world-wide celebrity as the scene of a great victory won by the Swiss Forest Cantons over the Austrians, November 15, 1815. The Swiss, who had command both of the narrow pass which wound between Morgarten Hill and the lake, and of the adjoining heights, numbered only 1400 men, while the Austrians amounted to 15,000, and were led by Duke Leopold, brother of the German Emperor. When the Austrian troops had fairly entered the pass, those of the Swiss posted on the rocks above hurled down great masses of stone, which threw the enemy's cavalry into confusion, besides killing immense numbers of them. Their comrades who held the pass, taking advantage of the disorder, now charged the Austrians repeatedly, and utterly routed them. Only a few escaped, among whom was Duke Leopold himself.

**MORGHEN**, Raphael Sanzio Cavallere, a famous engraver, was born at Florence, June 19, 1758. His first instructor in the art of engraving was his father, who, according to some, was a German, or the son of a German. The indications of talent that he gave were such as to induce his father to place him under Volpato at Rome. His progress then became very marked. Raphael's celebrated figures in the Vatican of "*Poetry*" and "*Theology*," were engraved by him in 1781; and he afterwards produced a succession of engravings of a very high class from many of the master-pieces of art: amongst these may be enumerated his prints from Raphael's "*Madonna della Seggiola*;" "*the Madonna del Sacco*," by Andrea del Sarto; the "*Transfiguration*," by Raphael; the "*Duke of Moncada*," by Van Dyck;

and by his *Barin*, Da Vinci's "Last Supper," notwithstanding its decay, has been rendered with such consummate skill, as to lessen the regret felt for the evanescent condition of the original work. He accepted an invitation from the Grand Duke to reside at Florence, with a pension of 400 scudi, and a free residence, under condition of keeping a public school; and received marked attentions from the Emperor Napoleon, to whom he dedicated his engraving from the "Transfiguration." M. died at Florence on 8th April 1833. He had married a daughter of Volpato's in 1781. His *Life*, with a portrait, and a catalogue of his works, was published by his pupil, Niccolò Palmarino. From this work, it appears that he has engraved 78 portraits, 47 religious, and 44 historical and mythological pieces, 24 views and landscapes, and 13 vignettes, crests, &c.—201 in all. The works of M. will always hold a very prominent place in the history of engraving. About the middle of last century, Strange had added a new feature to the art, by introducing, in a remarkable way, what is technically called by engravers "color," or the art of producing by management and variety of line, a texture or quality that compensates to some extent for the want of the actual colors in a picture. This influenced the style of Volpato, Cunego, and other Italian engravers of the period, who imitated, though with no very great success, the brilliancy produced by Strange. M., however, went far beyond these Italian engravers, for in his works he united much that was good in the engravings of Strange with a more correct and purer style of drawing, and thus brought out in a very high degree all the important qualities for which those master-pieces he so skilfully rendered, are distinguished.

**MORGUE**, a French word, denoting the inner wicket of a prison, at which persons accused or condemned are kept for some time, in order that the jailers and turnkeys may examine them at their leisure, so as to be able to recognise them when occasion requires. Hence the application of the word to a certain building (*La Morgue*) in the "City" (*La Cité*) of Paris, situated on the *Quai du Marché neuf*, where the dead bodies of persons unknown, found either in the river (Seine) or in the streets, are exposed to public view for three days. The corpses are put under a glass case, on a sloping slab of black marble. They are wholly naked, except across the middle, which is covered with a piece of leather. The clothes are hung on the wall above. When a corpse is recognised, it is handed over to the relatives or friends of the deceased, on payment of costs and dues—otherwise, it is interred at the expense of the city. The number of bodies yearly exposed in the *Morgue* is about 800, of which five-sixths are those of males.

**MO'RION**, an iron or steel head-piece worn by a man-at-arms in the days when armor was used. It was distinguished from the helmets of the knights and esquires in having neither visor nor beaver. Under the Norman laws, every yeoman between certain ages was bound to keep his morion ready for service.

**MORISON**, Robert, M.D., one of the most eminent botanists of the 17th c., was a native of Aberdeen, and having borne arms as a royalist in the civil wars, retired to France about 1650, and became superintendent of the garden formed at Blois by Gaston, Duke of Orleans. After the Restoration, he was appointed by Charles II. one of his physicians, and "botanist royal," and became Professor of Botany at Oxford. He died in 1693. His great work is "*Plantarum Historia Universalis Oxoniensis*" (2 vols., 1676—1699). He also wrote on umbelliferous plants.

**MORISONIANISM**, a name freely used to designate the distinctive tenets of the Evangelical Union (q. v.), but never accepted by that religious body. The system of doctrine so designated is fully enunciated in an authoritative document entitled "Doctrinal Declaration," which was issued by the Evangelical Union Conference of 1868—not as a fixed creed, but as a testimony to their distinctive faith. Being a recoil from the dominant Calvinism, of Scotland, it is of the Arminian type, but without any latitudinarian savor. The charge of Pelagianism often urged against it is indignantly repudiated by Evangelical Unionists, and, with reference to some modern aspects of Calvinism, is by them spiritedly retorted. It is a form of doctrine, in fact, which very nearly corresponds to that type of Evangelical Arminianism which obtains among the Wesleyans. Like that, it originated in an element of revival; and now, after the lapse of a generation, these same tenets are largely insisted on by revival preachers of the orthodox bodies at the present day. This coincidence is explained by the felt need, in all efforts to bring men to religious



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decision, to give prominence to the universalities of gospel grace, the duty of immediate faith, and the importance of peace with God as a subjective condition of the Christian life. It was these, and especially the doctrine that Christ died as an atonement in the same plenary sense for all men, which led to the separation, in 1841, of the Rev James Morison of Kilmarnock (now Dr Morison of Glasgow) from the United Secession Church, and of other three ministers at subsequent synods, and to the formation by them of the Evangelical Union in May 1843. A Theological Academy was at the same time instituted, presided over by Dr Morison, at which from twenty to thirty students annually receive training for the ministry. Many of these have gone to England, and some have attained good positions among the Nonconformists there. The Evangelical Union now embraces about fourscore ministers and churches, all Independent in polity, but many having ruling elders. In brief, the most distinctive doctrine of Evangelical Unionists is that which they prominently exhibit as the three great universalities of gospel grace—namely, the Divine Father loves all, the Divine Saviour died for all, the Divine Spirit strives for the salvation of all. Believing in the entire freedom of the human will, they hold predestination to be conditional. On such cardinal doctrines as the Trinity, Atonement, Justification, and the like, they symbolise with other bodies known as Evangelical.

**MORLAIX**, a seaport of France, in the dep. of Finistère, 45 miles north-northeast of Quimper. Vessels of 400 tons can reach the quays of the town. Pop. (1876) 13,519.

**MO'RMONS**,\* or, as they call themselves, **THE CHURCH OF JESUS CHRIST OF LATTER-DAY SAINTS**, are a religious sect founded by a native of the United States named Joseph Smith. Smith was the son of a farmer, and was born in the town of Sharon, Windsor County, Vermont, 23d December, 1805. When he had reached the age of ten, his parents removed to Palmyra, in the state of New York, and four years later, to the town of Manchester, about six miles off. The reputation of the family is said to have been of the worst kind; we are told that they avoided honest labor, were intemperate, untruthful, and suspected of sheep-stealing and other offences. These accusations are generally denied by M., but Smith himself partly admitted them, affirming that he "had never done anything so bad as was reported of King David, the man according to God's own heart." Nevertheless, a rude sensual religiosity appears to have been mixed up with his more carnal conduct. There is the most satisfactory evidence—that of his enemies—to shew that from an early period he was regarded as a visionary and a fanatic. This fact is of the utmost importance as affording a clue to his *real* character, and an explanation of that otherwise unaccountable tenacity of purpose and moral heroism displayed in the midst of fierce persecution. A mere impostor—i.e., a person who did not, in some sense or other, partly believe in his own mission, but who, on the contrary, felt that he was simply the liar and cheat that people called him—would have broken down under such a tempest of opposition and hate as Smith's preaching excited.

"When about fourteen years of age," Smith says, "I began to reflect upon the importance of being prepared for a future state." He then describes how he went from one religious denomination to another, but could find nothing satisfactory—nothing but "a great *dash* in religious sentiment." Then he began to withdraw into secret places, to spend hours in prayer and meditation, and to receive angelic visits. The second of these happened on the evening of the 21st September 1823, when it seemed as though the house was filled with "consuming fire." In a moment, a "personage" stood before him "with a countenance like lightning," and "visible to the extremities of the body," who "proclaimed himself to be an angel of God." He informed Smith of various important particulars, as, "that his sins were forgiven, and his prayers heard; that the covenant which God made with ancient Israel was at hand to be fulfilled; that the preparatory work for the Second Coming of the Messiah was speedily to commence; that the time was at hand for the Gospel to be preached in its power and fulness to all the nations; and that Smith was chosen to be an instrument in the hands of God, to bring about some of his purposes in this glorious dispensation." Besides all this, the angel gave him,

\* The origin of this name will appear in the sequel.

by way of appendix, "a brief sketch of the origin, progress, civilisation, laws, and governments" of the aboriginal inhabitants of America—"of their righteousness and iniquity; and the blessings of God being finally withdrawn from them." He was also informed where some plates were deposited, containing an abridgment of the records of the ancient prophets that had existed on the American continent. The angel appeared to Smith thrice that night, and afterwards paid him many visits. He told him where the records were deposited, "on the west side of a hill, not far from the top, about four miles from Palmyra, in the county of Ontario, and near the mail-road, which leads thence to the little town of Manchester." He advised him to go and view them, which Smith did; but the prophet was not yet holy enough to obtain possession of them.

At length, after due disciplinary probation, the angel of the Lord, on the 22d of September 1827, placed in Smith's hands the wonderful records. They were engraved on plates nearly eight inches long by seven wide, a little thinner than ordinary tin, and bound together by three rings running through the whole. The volume was altogether about six inches in thickness, a part of which was sealed. The characters, letters, or hieroglyphics upon the unsealed part were small, and beautifully engraved. They represented an unknown language called the "Reformed Egyptian." Along with the records was found a curious instrument, called by Smith "Urim and Thummim," consisting of two transparent stones, set in the rim on a bow fastened to a breastplate. By means of these stone spectacles, God enabled him to understand and translate the ancient records into such humble English as the "prophet" (who had received almost no school-education, and could read with difficulty) was master of. The records contain the primitive history of America, from its first settlement by a colony that came from the Tower of Babel, at the confusion of languages, to the beginning of the 5th c. of the Christian era. These primitive colonists were called Jaredites; they were a wicked and bloody race, and finally, like the Kilkenny cats, mutually destroyed each other, millions being slaughtered in the final conflicts. Silence again settled down upon America. But a new race came directly from Jerusalem about 600 B.C. These consisted of Lehi and his wife; his four sons, Laman, Lemuel, Sam, and Nephi, together with their four wives; two "sons of Ishmael," and their two wives; Zoram, a servant, and his wife; in all, sixteen men and women. They are supposed to have landed on the coast of Chili. After the death of Lehi, quarrels broke out among the brothers. The Lord had appointed Nephi to be the ruler of the new race of colonists, but his elder brothers would not hear of it; as a punishment for which, they and all their posterity were condemned to have dark skins, and "to become an idle people, full of mischief and subtlety, which did seek in the wilderness for beasts of prey." They are the ancestors of the American Indians, who are thus, according to Smith's records, simply *bad Hebrews*. The descendants both of Nephi and of his rebellious brothers, increased and multiplied, but were almost continually at war with each other. In the time of Nephi the second, an awful earthquake announced the Crucifixion. Three days afterward, Christ himself appeared out of heaven; shewed the Nephites his wounded side and the print of the nails; instructed them for forty days in the truths of Christianity; healed the sick, blessed children, administered the sacrament, and planted churches, with apostles, prophets, pastors, teachers, and evangelists—the same order, the same priesthood, the same ordinances, gifts, powers, and blessing as was enjoyed on the eastern continent. Hostilities, however, between the Nephites and their dark-skinned brethren continued to rage as fiercely as ever; gradually the purity of their faith declined; and finally, in 384 A.D., a decisive conflict took place at the hill Cumorah, in Western New York, where the Christian Nephites were nearly annihilated; miracles now ceased, and unbelief gradually became supreme. Shortly before this, however, a prophet called *Mormon* had been commissioned by God to write an abridgment of all their prophecies, histories, &c., and to hide it in the earth, till God should see fit to bring it forth, and "unite it with the Bible for the accomplishment of his purposes in the last days." This is the famous *BOOK OF MORMON*, believed by the followers of Smith (hence called *MORMONS* and *MORMONITES*), to be of equal authority with the Jewish and Christian Scriptures, and to form an indispensable supplement to them, containing God's revelations to the New, as the others to the Old World.

In 420 A.D., they were finally sealed up where Smith found them, by Moroni, one of the few survivors of the battle of Cumorah.

The way in which Smith translated was as follows: he sat behind a blanket hung across the room to keep the sacred records from profane eyes, and read off by the help of his "Urim and Thummim," to one Oliver Cowdery, who wrote down what the invisible "prophet" gave as a translation—Smith himself being, as he confesses, but a "poor writer." A farmer, of the name of Martin Harris, supplied Smith with the necessary funds to get the work printed. The "Book of Mormon" finally appeared before the world in 1830, with the names of Oliver Cowdery, Martin Harris, and David Whitmer appended to a statement, that an angel of God had come down from heaven and shewn them the original plates. This was immediately followed up by the testimony of eight other witnesses, among whom were Smith's own father and two brothers (suspected, however, it must not be forgotten, of being addicted to sheep-stealing and other nefarious practices), who affirmed that "Joseph Smith, junior," had shewn them the mysterious plates. These, however, are the only persons who have been so privileged. No other human being has ever seen them. Like Macpherson's Ossianic MSS., they have never been forthcoming, however loudly demanded, and of late years, all knowledge of them has become traditional.

Attention was soon drawn to the newly published work, and a controversy sprung up regarding its real authorship. Evidence was brought forward by the opponents of Smith to shew that with the exception of certain illiterate and ungrammatical interpolations, bearing on religious matters, the so-called "Book of Mormon" was really borrowed or stolen nearly *verbatim* from a MS. romance written by a quondam clergyman named Solomon Spalding, who died in 1816. It is unnecessary to go over the arguments *pro* and *con*. Suffice it to say, that *anti*-Mormons generally think them conclusive; while the "Saints" consider the whole story of Spalding's MS. romance a scandalous fabrication. About 1829 Smith became acquainted with one Sidney Rigdon, originally a compositor and preacher, but who by this time had begun to promulgate a species of incipient Mormonism, and had managed to found a little sect of his own. It is conjectured by the opponents of Mormonism that Rigdon (into whose hands Spalding's romance is supposed to have fallen for some time) gave it to his new associate to further his purposes, and that the latter—in whose soul there may have been (according to our theory of his character) some rude and gross religious notions and feelings—devised the ungrammatical interpolations. This theory acquires some probability from the fact, that these religious passages do not refer to old-world faiths and the practices of an ancient ritual, but to quite modern questions, such, we are told, as were rife in the villages of Western New York about 1830. Calvinism, Universalism, Methodism, Millenarianism, Roman Catholicism, are discussed, if not in name, yet in reality. Infant baptism is condemned; so, strange to say, are polygamy and free-masonry.

Undeterred, nevertheless, by exposure, ridicule, and hostility, Smith and his associates persevered in preaching their "doctrine," which was a new Americanised phase of millenarianism. They declared that the millennium was close at hand, that the Indians were soon to be converted, and that the New Jerusalem—the final gathering-place of the Saints—was to be somewhere in the heart of the American continent. The "prophet's" house "was frequently beset by mobs, and evil-designing persons; several times he was shot at, and very narrowly escaped;" but his fearless courage continued to bring him disciples; and on April 6, 1830, the *Church of Jesus Christ of Latter-day Saints* was first organised in the town of Manchester, state of New York. Smith was fiercely attacked by the leaders and preachers of the other religious denominations, but he kept his ground stubbornly, argued pretty well, and when argument failed, had recourse to a style of zealous prophetic asseveration, which is generally irresistible with weak and ignorant people. If the orthodox preachers, however, could not baffle him in speech, they knew how to inflame their hearers with the most ferocious animosity against the new sect; and in January 1831, Smith and his followers considered it prudent to remove to a distant part of the country. They established themselves at Kirtland, in Ohio, which was to be the seat of the New Jerusalem. They now made immense progress. Their missionaries were full of zeal (none more so, however, than Smith himself), converts were made in great numbers, and churches

were established in the states of Ohio, Pennsylvania, New York, Indiana, Illinois, &c. Still the eyes of the new sect turned westward—to the region of the great prairies, where they might be allowed to work out their system in peace and freedom. In the autumn of 1831, a colony was established in Jackson County, Missouri, which a "revelation" given to Smith assured the Saints was "the land of promise and the place for the city of Zion." Land was largely bought; preaching was vigorously carried on, a printing-press was established, a monthly periodical, "The Morning and Evening Star," and a weekly newspaper, "The Upper Missouri Advertiser," were started to propagate the doctrines of the new sect; everywhere was visible a spirit of industry, sobriety, order, and cleanliness. It is only fair to the M. to state these things. Account for it how we may, they were, in many important respects, morally, socially, and industrially, far in advance of their neighbors. When Smith returned to Kirtland, he set up a mill, a store, and a bank, and continued his propagandist labors with great success, but not without savage persecution; thus, for example, on the night of March 22, 1832, a mob of Methodists, Baptists, Campbellites, and other miscellaneous zealots, broke into the prophet's house, tore him from his wife's arms, hurried him into an adjoining meadow, and tarred and feathered him! Sidney Rigdon was similarly handled, and rendered temporarily insane. Smith, however, undaunted by this brutal treatment, preached next day with his "flesh all scarified and defaced," and proved the folly of persecution by baptising three new converts in the afternoon. Meanwhile, the brethren in Missouri continued to prosper, but this very circumstance deepened the animosity towards them of all who were not Mormons. Whispers also began to be spread about their indulging in a community of wives. The rumor was not true, but it probably originated in Rigdon's theory of the "spiritual wife," which Smith at first denounced, but afterwards accepted, and thereafter commenced "sealing wives" to himself in some mysterious way that Gentiles cannot yet fathom. This first step towards polygamy, a doctrine not yet revealed, however (in fact, *contrary* to the "revealed doctrine" on the subject), materially helped to inflame the hostility of the impulsive and unscrupulous backwoodsmen. Secret societies (according to Smith, composed "of the basest of men") were formed to expel the M. from Missouri; their periodicals were stopped, their printing-press confiscated, their bishops tarred and feathered, and numberless other outrages were committed. Finally, the hapless "Saints" were compelled to flee across the Missouri River, and men, women, and children had to encamp in the open wilderness on a winter-night in 1833. They subsequently settled in Clay County, in the same state, where they remained upwards of three years. In July, 1834, they were visited by the "prophet" himself, accompanied by 100 persons, mostly young men, and nearly all priests, deacons, teachers, and officers of the church. During a brief residence of one week among them, he accomplished much in the way of vigorous organisation; next year, 1835, a further step was taken in the development of a hierarchy by the institution of a body of apostles—twelve in number—who were sent out to preach the new doctrines among the Gentiles. One of these twelve was the famous Brigham Young, who had become a convert about the close of 1832, and had soon shewn himself to be a man of wonderful sagacity and force of character. He was ordered down east among the Yankees, and made numerous converts even among this acute people. In 1837, Orson Hyde and Heber C. Kimball were despatched as missionaries to England, where they received large accessions to their numbers, especially from the masses in the great manufacturing and commercial towns, Manchester, Liverpool, Leeds, Birmingham, Glasgow, and, above all, from the mining districts of South Wales, where Mormonism, in some places, almost competed for popularity with Methodism itself. Since then, they have extended their strange evangelisation to the East Indies, Australia, the islands of the Pacific, Egypt, Palestine, Turkey, and almost every country on the continent of Europe.

About the close of 1837, or the beginning of 1838, the bank at Kirtland stopped payment, and proceedings were taken against the prophet and others for swindling. Luckily, just at this moment, he received a "revelation" to depart into Missouri, which he instantly obeyed, with all the more alacrity that internal disorders had painfully manifested themselves in the new colony. These were at last healed;

but the conflict between the Saints and the other Missourians became fiercer, more envenomed, more sanguinary than ever, assuming, in fact, almost the proportions of a civil war. The prophet and Rigdon were thrown into prison, and finally, towards the close of 1838, the whole body of Saints, about 15,000, quitted Missouri, and took refuge in Illinois. Here they obtained a grant of land in the vicinity of the little town of Commerce, a name which the M., in obedience to a "revelation" given to Smith, changed to Nauvoo, or The City of Beauty. The country was a mere wilderness when the M. settled in it: it soon began to rejoice and blossom as the rose. Lieutenant Gunnison (a most intelligent and impartial writer) is forced by facts to be eloquent in praise of Mormon industry, and gives us a perfectly enchanting picture of the new colony. The legislature of Illinois granted a charter to Nauvoo; a body of Mormon militia was formed, under the name of the Nauvoo Legion, of which the prophet was appointed commander; he was also appointed mayor of the city, and was thus supreme in all matters civil and military, as well as religious. But the doctrine of "sealing wives" once more roused the wrath of the neighborhood, and serious disturbances took place, the ultimate result of which was that the prophet and his brother Hyram were thrown into prison at Carthage. After a short time, it began to be rumored that the governor of the state was desirous of letting the two Smiths escape, whereupon a band of "roughs," about 200 in number, broke into the jail, 27th June 1844, and shot them. Disastrous as this termination of his career was to Smith himself, there cannot be the shadow of a doubt that it was a most fortunate thing for the system which he founded. "The blood of the martyrs is the seed of the church." A halo of solemn and tender glory now encircles the memory of one who stood greatly in need of this spiritual transfiguration. It may here be stated that it cannot be shewn that Smith was a polygamist, in our sense of the word. Years after his death, Brigham Young produced a paper which he said was a copy of a "revelation" made to Joseph at Nauvoo, commanding him to take as many wives as God should give him. But it was not till August 29, 1852, at a public meeting held in the Salt Lake City, that the "revelation" was formally received.

Smith's death created great agitation and confusion among his followers. Sidney Rigdon and others aspired to succeed him, but the Council of the Twelve Apostles unanimously elected Brigham Young, and events have shewn the wisdom of their choice. The legislature of Illinois having revoked, in 1845, the charter given to the city of Nauvoo, and the hostility of their neighbors not having in the least abated, the Saints resolved to emigrate far beyond the boundaries of civilization, and to seek a new home amid the solitudes of the Rocky Mountains, where they might pass their lives in unmolested peace. Explorers were sent out to examine the country, and brought back a favorable report of the Great Salt Lake Valley. See **GREAT SALT LAKE, SALT LAKE CITY, and UTAH**. In February 1846, the first emigrants crossed the ice-bound Mississippi, settled for a year in Iowa, and then marched under the strictest discipline across the great wildernesses. Agricultural operations were commenced almost the instant they arrived at the shores of the Salt Lake. The cheerfulness, intelligence, and zeal exhibited on all sides, were truly admirable. The world has never seen swifter, more active, more glad-hearted colonists than these singular "Saints." It would be unfair to shut our eyes to such facts. In judging Mormonism, we must keep them constantly in view, to prevent us from forming mere abstract and theoretical decisions, which will not in the least affect the future of Mormonism. Brigham Young arrived in the Valley, July 24, 1847, and the main body of the M. in the autumn of 1848. The Salt Lake City was soon founded, an emigration fund established, and settlers poured in from all parts of Europe and America; and perhaps a greater amount of physical comfort was enjoyed here than in any other part of the world. In 1850, the government of the United States admitted the region occupied by the M. into the Union as a territory, under the name of **UTAH**, and Brigham Young was appointed governor by President Fillmore. District judges were also appointed by the federal government, but these were looked upon with great suspicion and mistrust by the Saints, who finally drove them out of the country in 1861. Brigham Young was now suspended from his office of governor, and Colonel Steptoe of the United States army was appointed his successor. He arrived in Utah in 1854, but found it prudent after some time to withdraw from the country. During the next two years, the collisions between the United States officers and the Saints became more and more frequent, and in the spring of 1856,

the whole of the former were forced to flee from the territory. A new governor, Alfred Cumming, was appointed by the authorities at Washington in 1857, and also a new superintendent of Indian Affairs; besides, a force of 2500 men was sent to enforce obedience to the laws of the United States. The Saints attacked their supply-trains, and compelled the enemy to winter at some distance from the Salt Lake. In the early part of next year, negotiations were entered into between the contending parties; the M. submitted to the federal authority, and the federal troops were allowed to encamp on the western side of Lake Utah, about forty miles from Salt Lake City, where they remained till 1860, when they withdrew. After the close of the Civil War, the United States seemed determined to insist on its authority. A Federal governor was again appointed, and polygamy was declared in 1871 to be a criminal practice contrary to the laws of the United States; Brigham Young was even arrested. One of the most notable events in the recent history of the M. took place in the year of Brigham Young's death (1877). John D. Lee, a Mormon bishop, was brought to trial and executed for his share in a crime till then uninvestigated. In 1857 a party of M. and Indians, under Lee's command, assaulted a train of 160 non-Mormon emigrants at Mountain Meadows, near Utah, and massacred every soul of them. The complicity of the leaders of the church was not proved, but Lee had been clearly the immediate instigator of the deed.

**Hierarchical Organisation.**—Mormonism is a pure theocracy; its priesthood, who rule in matters temporal and ecclesiastical, are divided into various orders. The highest is the *First Presidency*, composed of three persons, who are the successors of Peter, James, and John in the Gospel Church. Of these, even Brigham Young was nominally only *primus inter pares*. The first presidency is elected by the body of the church, and possesses supreme authority. The second office in point of dignity is that of *Patriarch*, held at present by the nephew of Joseph Smith, whose chief duty is to administer blessings. Then follows the council of "The Twelve," whose functions are of great practical importance. They ordain all other officers, elders, priests, teachers, and deacons; they baptise, administer the sacraments, and take the lead in all meetings. Next come the *Seventies* (of whom there are many). They are under the direction of the "Twelve Apostles"—and are the great propagandists, missionaries, and preachers of the body. The fifth order is that of *High-priests*, composed usually of men advanced in years. Their duty is to officiate in all the offices of the church when there are no higher authorities present. After these come the *Bishops*, who are "overseers" of the church chiefly in secular matters, attending to the registration of births, marriages, and deaths, the support of "literary concerns" (such as newspapers and magazines), home-visiting, the settlement of private grievances, and the care of the poor. Indeed, according to Dixon ("New America," vol. i, p. 260), "a bishop's main function is to see that no man in his ward, in his county, is in want of food and raiment." The duties of the *Elders* are not very precise; they are charged with the conduct of meetings, and exercise a general surveillance over the *Priests*, who correspond to the "fixed ministry" of other sects, i. e., they preach, exhort, and expound the Scriptures. The lowest orders are the *Teachers* and *Deacons*; the former are simply assistants to the priests, elders, and bishops, and act as catechists; the latter are church-collectors, treasurers, &c.—The whole priesthood is divided into two classes, the Melchisedek and the Aaronic. To the first belong the offices of apostle, seventy, patriarch, high-priest, and elder; to the second, those of bishop, priest, teacher, and deacon. The latter can be held only by "literal descendants of Aaron," who are pointed out by special revelation.

**Doctrine.**—The Saints are almost incredibly materialistic in their doctrines. Their Godhead is formed on Buddhist principles. While professing to believe in the Trinity, they explain that God was once a man; who has, however, so advanced in intelligence and power, that he may now be called (comparatively speaking) perfect, infinite, &c., but that he has still the form and figure of a man; he has even "legs," as is evident (says Mr Pratt, "the leading scholar of the Mormon Church") from his appearance to Abraham; though he has this advantage over his creature, that "he can move up or down through the air without using them." Christ is the offspring of the "material" union, on the plains of Palestine, of God and the Virgin Mary—the latter being duly married after betrothal by the angel Gabriel. Yet he is believed to have had a previous existence, to have even made the universe

out of "unformed chaotic matter as old as God," and his worship is enjoined as Lord of all. The Paraclete is vaguely described, but is also material. It would appear, however, that there is an older Trinity, that of "Elohim, Jehovah, and Michael, which is Adam." Adam, again, is declared to be the "god" of Jesus Christ; Jesus Christ, the god of Joseph Smith; and Joseph Smith is now the god of this generation; but the whole affair is a mass of unintelligible rubbish. The human intellect probably never sank into more abysmal nonsense; all that can be definitely set before the mind is, that M. believe that by faith, obedience, holiness, any man may rise into a deity, and acquire the power of making, peopling, and ruling a "world" for ever! The *second* article of the Mormon creed affirms that "men will be punished for their own sins, and not for Adam's transgressions; the *third* article states that "through the atonement of Christ, all mankind may be saved by obedience to the laws and ordinances of the Gospel." The *fourth* article affirms these "ordinances" to be: 1. Faith in the Lord Jesus. 2. Repentance. 3. Baptism. 4. Imposition of hands by the gift of the Holy Spirit. 5. The Lord's Supper, administered kneeling. The Saints, who are much averse to strong drinks, use water instead of wine in the sacrament, which is taken every week. The *fifth* article declares that "men must be called to the work of God by inspiration;" the *sixth*, that the same organisation must now exist that existed in the primitive church; the *seventh*, that miraculous gifts—"discerning of spirits, prophecy, revelations, visions, healing, tongues," &c.—have not ceased. The "discerning of spirits" led Smith, or rather his friends Rigdon, Pratt, &c., who are understood to be the real authors of the metaphysics, into a variety of curious speculations. They believe that the soul of man was not created, but "coexisted equal with God." The *eighth* article is decidedly liberal; it expresses a belief that the word of God is recorded not only in the Bible and the Book of Mormon, but in "all other good books." As for the contradictions that exist in the first, they are admitted, but it is alleged that they are "corruptions," and that they can be removed by any prophet's inspired explanations. On the other hand, the statement that the Saints pretend to have a new and inspired translation of the Bible was denied by Brigham Young in a conversation with Dixon ("New America," vol. i., p. 216-217). The *ninth* article expressed a belief in all that God has revealed, is revealing, or will yet reveal. The *tenth* affirms the literal gathering of Israel, the restoration of the Ten Tribes (the "American Indians," who are, in consequence, treated with considerable humanity by the Saints; the Negro, on the other hand, being excluded from the Mormon Church, as a descendant of Cain), the establishment of the New Zion on the western continent—the millennial reign of Christ on earth, and the transformation of earth into a Paradise. The *eleventh* article maintains "the literal resurrection of the body." The *twelfth* article asserts the absolute liberty of private judgment in matters of religion; the *thirteenth* declares it the duty of the Saints and all others to be "subject to the powers that be," whether monarchical or republican. The *fourteenth* and last is worthy of being universally accepted: "We believe in being honest, true, chaste, temperate, benevolent, virtuous, and upright; and in doing good to all men;" also that "an idle or lazy person cannot be a Christian, neither have salvation."

The great social peculiarity of the sect is their practice of polygamy. It was not so, however, at first. Rigdon, Kimball, Pratt, Hyde, and Young are its true originators; Emma, wife and widow of the prophet, stoutly denied that her husband ever had any wife but herself. Young's "revelation" she declared to be a fraud, and in consequence she withdrew to Nauvoo. Her four sons followed her, and have now founded a monogamic Mormon community, called the *Josephites*. Another branch of the M. (who altogether may number 200,000 souls) has recently settled, at Independence, Missouri, the proposed site of the "New Jerusalem." Meanwhile, at Salt Lake City, the practice of polygamy is encouraged on the ground that the rank and dignity of the Saints is proportioned to the number of their wives and children. A defence of the practice is also set up on moral grounds. M. assert that their community is free of the horrible sin and viciousness that prevail elsewhere; fornication and adultery, with their guilty passions and abandoned conduct, are declared to be unknown; their wives are asserted (Burton and others are very strong on this point) to be happy, virtuous, and healthy, and they challenge comparison in regard to their domestic and social purity and felicity with any monogamic community in the

world. Dixon ("New America," vol. i. p. 243) even sings a sort of prean on their virtues: "Their streets are clean, their houses bright, their gardens fruitful. Peace reigns in their cities. Harlots and drunkards are unknown among them. They keep open more common schools than any other sect in the United States."

See "Book of Mormon" (1830); "Book of Doctrine and Covenants," consisting of select "revelations" given to Smith (1832); "The Pearl of Great Price," also by Smith (first published, Liverp. 1851); "Journal of Discourses," by Brigham Young and others (1854 *et seq.*); "The Exploration and Survey of the Great Salt Lake," by Captain Stansbury (1849); "The Mormons, or Latter-day Saints," by Lieutenant Gunnison of the United States Topographical Engineers (1852); "The Mormons," by Col. T. L. Kane (1860); "The Mormons, or Latter-day Saints, with Memoirs of the Life of Joseph Smith" (Office of the National Illustrated Library, London); "Voyage au Pays des Mormons," par Jules Remy (1860); "The City of the Saints," by R. F. Burton (1861); Dixon's "New America" (1867); and Busch, "Geschichte der Mormonen" (Leips. 1870).

**MORMYRIDÆ**, a family of malacopterous fishes, allied to the *Esocidæ*, or Pike family; having longish compressed bodies, and a slender tail, swelling out at the origin of the caudal fin. The skin of the head is naked, enveloping the gill-covers and gill-rays, leaving only a slit for gill-opening. The mouth is small. All the known species inhabit the rivers of Africa. The **SHARP-NOSED MORMYRUS** (*Mormyrus oxyrinchus*) is regarded as one of the best fishes of the Nile. It is caught by lines baited with worms. The *M.* are nocturnal fishes. They are sometimes represented on Egyptian monuments, and seem to have been held sacred by the ancient Egyptians. The modern Egyptian name is *Mizdeh*. Some of the species have electric organs.

**MORNY**, Charles Auguste Louis Joseph, Comte de, a French statesman, of the second Empire, regarding whose parentage the biographical dictionaries published under imperial censorship are strangely silent. It is, however, universally believed that he was the son of Queen Hortense and of the Comte de Flahaut, and consequently half-brother of Louis Napoleon. He was born in Paris, October 20, 1811. The Comte de Morny, a French nobleman resident in Mauritius, received 800,000 francs to adopt him as his son; but he was educated by his "grandmother," Madame de Flahaut; and Queen Hortense left him at her death, in 1837, an annuity of 40,000 francs. *M.* entered the army in 1832 as a sub-lieutenant, and is said to have shewn at this early period a predilection for metaphysics and theology, which is indeed sufficiently surprising, if true, considering his subsequent thirst for material gratifications. He served with some distinction in Algeria; but he soon abandoned a military life, and in 1838, made his début in the world of industry as a manufacturer of beet-root sugar, and published a pamphlet on the subject. Ever after that time, he was mixed up in all sorts of commercial and financial speculations—railway companies, canal companies, French and foreign mining companies, credit societies, industrial enterprises, &c. Chosen a deputy in 1842, he quickly attained a prominent position on account of his aptitude for dealing with financial questions; but events shewed that he was not free from the reckless spirit of an adventurer, and his daring at times excited a suspicion of enormous swindling somewhere. After the revolution of 1848, he became attached to the cause of his half-brother, and was the leader of the subtle and treasonable policy of the Elysée. He took a prominent part in the *coup d'état*. His rôle was to exhibit *coup-froid*, and to throw the republican leaders off their guard. Nor did he fail of success. He passed the evening of December 1 at the *Opéra Comique*, and yet, by six o'clock the next morning the deed was done, and *M.* was Minister of the Interior. In 1854, he became president of the *Corps Législatif*, and was ambassador to Russia during 1856–1857, where he married the rich and handsome Princess Trubetskoi. The result of his Russian mission was the establishment of intimate political relations between the two governments, and a commercial treaty advantageous to both countries. He died May 1865.

**MOROCCO**, or Morocco, called by the natives *Maghrib-el-Aksa*, "the extreme west," or briefly *Maghrib*, an empire or sultanate in the north-west of Africa, is bounded on the e. by Algeria, on the n. and w. by the Mediterranean Sea and Atlantic Ocean, and on the south by a line which runs from Cape Nun (lat. 28° 45' 48" n.), in an easterly direction through the Sahara to the Algerian frontier in long. 9° e. At



the present day, M. includes the three former kingdoms of Maghrib, Fez, and Tafilélet, and contains about 260,000 English square miles, with a population of which the estimates vary from 2,500,000 to 3,000,000. The country is generally mountainous, the Atlas (q. v.) range traversing it in several parallel chains from south-west to north-east, and sending out numerous spurs to both the coast-country and the desert. There are, however, many level tracts throughout M., especially at its western and eastern extremities, and on the borders of the desert. The central range of the Atlas forms the water-shed separating the streams which flow into the Atlantic and Mediterranean from those which run southward to the desert. The former rivers have the shorter course and less volume, but they are perennial; while the latter become dry in summer, and even when running are lost in the sands of the Sahara. The chief rivers are the Muluya, with its tributary the Sharef, which drains the north-east of the country, and falls into the Mediterranean after a course of 400 miles; the Kos, Oom-a-beg, Bu-Regreb, Tensift, Suse, and As-aker, the last forming for part of its course the southern boundary of M., drain the central and western districts, and fall into the Atlantic; the Draha, Feli, Ziz, and Gir, irrigate the dry plains of Tafilélet, and the first-mentioned then empties itself into the Atlantic Ocean. The subsequent courses of the other three rivers are not yet well ascertained.

The climate between the central range of Atlas and the sea is temperate, the thermometer seldom falling lower than 40° F., or rising above 90° F., owing partly to the regulating influence of the sea-breeze, and the shelter afforded by the mountains from the scorching winds of the desert; but in the south-east districts, extremes of heat and cold are said to prevail, and rain is there unknown.

Among the chief products of the country are wheat, barley, rice, maize, durra, and sugar-cane; and among fruits, the fig, pomegranate, lemon, orange, and date are common; while cotton, tobacco, hemp, &c., are largely produced both for home use and export. M. is supposed to be rich in mineral treasures; plentiful supplies of copper are obtained at Teseleht, near the source of the Asaker, and gold and silver occur in several places. Iron, antimony, lead, tin, and rock-salt, the last three in considerable quantity, are also found. Owing to the character of the country and its thin population (33 to the English square mile), M. is much infested with wild animals. Lions, panthers, hyenas, wild-boars, and various kinds of deer, gazelles, &c., abound in suitable localities, and occasional devastating are committed by locusts. Ostriches are found in Tafilélet. The Moorish horses, formerly so famous, are now much degenerated. The breeding of sheep, oxen, goats, camels, mules, and asses, forms an important item of national industry. Oxen and bulls are chiefly employed in field-harbor.

The inhabitants, like those of Barbary in general, consist of Moors, Berbers, Arabs, Negroes, and Jews, with various intermixtures between these races. More than two-thirds of the population belong to the race commonly called Moors, the remaining third consisting mainly of Berbers or Amaziyehs (including the Berbers of the Rif Coast, and the Shilluhs of the Great Atlas); Jews, estimated at 240,000; and negroes. Very few Europeans reside in Morocco. The state of civilisation is very low, and many of the Amaziyehs are complete savages. Excepting the Jews and the few Europeans, the whole population is Mohammedan. Negroes are brought into the country as slaves from Sudan.

M. is divided into four territories—Fez, Morocco, Suse, and Tafilélet. For convenience of administration, the empire is subdivided into 33 governments or districts ("amnahs"), each under the superintendence of a "caid," whose chief duty it is to collect the imposts; but the semi-independent tribes are ruled by their own chiefs, and scarcely acknowledge the authority of the sultan. The government is purely despotic, and in the absence of written laws, the will of the sultan and his subordinates decides everything. The public officials eke out their allowances by practising extortion on those under their charge, and are in turn plundered by their superiors. The sovereign of M., called by Europeans the Emperor of M., is known among his subjects as sultan, and assumes the titles of *Emir-ul-muminin*, or "Prince of the Believers," and *Khalifah-Allah-shalkih*, or "Vicerent of God upon Earth." The title is hereditary in the male line, but does not necessarily descend to the eldest son.

Education consists in learning to read, write, and recite portions of the Koran,

and this quantum of education is pretty generally diffused among the people, but the art of printing is unknown, and the arts and sciences are at a very low ebb.

The only industrial arts prosecuted to any considerable extent are the manufactures of caps, fine silks, and leather. In the production of this last, the Moors far surpass Europeans, and are able to render any kind of leather extremely soft and white, by the use, it is said, of two species of plants found in the country, and unknown to Europeans. They also excel in the production of brilliant colors in leather. The yellow leather is made in M. Proper, the green in Tafflelet, and the red in Fez. There is an important caravan-trade between M. and Sudan, and also with Mecca and the Levant. The principal exports are wool, hides, grain, cattle and sheep, leather, salt, &c.; and the imports, cotton, linen, and muslin goods, sugar, tea, coffee, hardware, gold-dust, indigo, ivory, &c. Mules, horses, and camels, form the internal means of transport. Much of the Arabian trade is carried on by coasting-vessels between Tangier and Egypt, as the carriage across the desert is very costly. At the present time, two-thirds of the entire trade of M. is in the hands of British merchants.

The army consists of between 20,000 and 30,000 men, of whom one-half are negroes; there is also a sort of militia, amounting to 80,000 or 100,000 men, which is occasionally called out. The navy is now insignificant; but in former times, especially in the 16th and 17th centuries, it was very formidable to the maritime powers of Europe, and was chiefly occupied in piratical expeditions. See *RIF*.

The history of M. is, generally speaking, similar to that of the rest of Barbary (q. v.) down to the end of the 15th century. About that time, it was formed into a monarchy, and notwithstanding internal divisions, enjoyed considerable prosperity, and the confines of the empire were extended as far south as Timbuktu. This empire fell to pieces, and was succeeded in 1647 by that of the Sherifs of Tafflelet, who conquered both M. Proper and Fez, and united the whole country under one government. This is the present ruling dynasty. In the middle of the 17th c., the empire of M. embraced part of the present province of Algeria, and extended south as far as Guinea, where it came into collision with the Portuguese settlements. Since the commencement of the 19th c., the rebellions of the wild mountain tribes, the disturbances in Algeria, and difficulties with foreign states, caused by the aggressions of the Riff pirates, have greatly retarded the well-conceived measures of the various rulers for the development of the resources, and increase in civilisation of Morocco. In 1814, the slavery of Christians was abolished; and in 1817, piracy was prohibited throughout Morocco. In 1844, M. took part in the war of Abd-el-Kader against the French, in the course of which Tangier was bombarded and Mogadore occupied; but peace was concluded in the same year. In 1851 and 1856, complications took place with France concerning some French vessels which had been plundered by the Riff pirates, but in each case compensation was given by the sultan. In 1859, the Spanish government, smarting under a series of similar outrages, demanded compensation, and also an apology for an insult to the Spanish flag at Ceuta; and on the sultan's disclaiming all responsibility for these acts, war was declared by Spain, October 23, 1860, and a large force under Marshal O'Donnell invaded Morocco. Two battles were fought, several ports were bombarded, and Tetuan taken, and on March 25, 1860, the sultan yielded. A treaty was accordingly signed, April 27, 1860, by which the sultan ceded some portions of his territory, paid 20,000,000 piastres towards the expense of the war, and granted several commercial privileges to Spanish merchants.

**MOROCCO** (Arab. *Marakash*), the capital of the empire of the same name, is situated in the south-west of the country, 4 miles south of the river Tensift, and at the north end of an extensive and fertile plain. It is surrounded by a strong lime-and-earth wall 30 feet high. The town is ill built, the streets narrow, irregular, and unpaved; the houses, generally built of the same materials as the wall, are one story high, with flat roofs, and narrow openings instead of windows. A large portion of the space within the walls is occupied with gardens, open areas and market-places. In the bazaar and market-place, a large miscellaneous trade is carried on. M. possesses 20 mosques, of which 6 are remarkable for their size and elegance. There are several tanning and leather-dyeing establishments, some of them of great extent. The population is estimated at about 60,000.

Moron  
Mo. se

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On the south of the city, outside the walls, stands a palace of the sultan of M., occupying a space of about 190 acres.

M. was founded in 1073, and reached the summit of its prosperity in the 18th c., when it contained more than 700,000 inhabitants, since which time it has been rapidly decaying. It is now half in ruins.

MORO'N, a town of Spain, in the province of Seville, and 87 miles south-east of the city of that name, on the Guadaira. It is built on irregular acclivities, and contains the remains of a once almost impregnable castle, erected by the Moors on Roman foundations. The inhabitants are engaged in the culture and preparation of olive-oil. Pop. 9000.

MO'RPETH, a market-town and parliamentary and municipal borough of England, in Northumberland, is situated on the Wansbeck, 15 miles north of Newcastle. Of the principal buildings, the parish church dates from the 14th c.; the Free Grammar-school of Edward VI., founded in 1552, has an income from endowment of £650 a year; the town-hall was erected by Sir John Vaubrough. Flannel is manufactured; brewing, malting, and tanning are carried on, and iron foundries, and corn-mills are in operation. M. returns 2 members to the House of Commons. The pop. of the parliamentary borough in 1871 was 30,289.

MO'RPHEUS (literally, the "shaper" or "fashioner"), in the Classic Mythology, the son of Somnus (Sleep), and the god of dreams. He is so named, because he shapes or moulds the dreams that visit the sleeper. He is first mentioned by Ovid, and is represented as an old man with wings, pouring somniferous vapor out of a horn.

MO'RPHIA ( $C_{17}H_{15}NO_6 + 2 Aq$ ) derives its name from Morpheus, in allusion to its narcotic properties. It is the most important of the alkaloids existing in opium, of which it constitutes from  $\frac{1}{10}$ th to  $\frac{1}{16}$ th by weight. It occurs in combination with meconic, and sometimes with sulphuric acid. It is obtained in short rectangular prisms, containing two equivalents of water of crystallization, which are expelled at a gentle heat, when the morphia melts into a resinoid substance. Morphia is soluble in about 1000 parts of cold and in 400 of boiling water; boiling alcohol dissolves it freely, but it is insoluble in ether and chloroform. Its solutions have a bitter taste, and change the yellow color of turmeric paper to brown. Morphia is not so easily detected in cases of poisoning by opium as Meconic Acid (q. v.). The following are the ordinary tests for it: concentrated nitric acid, when applied to a crystal either of morphia or of one of its salts, produces an orange color. A mixture of nitric and sulphuric acids colors it green. When it is mixed with iodic acid, iodine is liberated, which may be recognised by its brown color and by the well-known starch-test. A neutral solution of perchloride of iron produces a beautiful blue color.

Morphia is the only opium-alkaloid which is soluble in lime-water, and this property affords one of the best means of extracting it. A watery infusion of opium is boiled with milk of lime, filtered, mixed with powdered sal-ammoniac, and again boiled. By this means, the lime is converted into the hydrochlorate (or, more correctly, into chloride of calcium), the ammonia is volatilised by the heat, while the morphia is precipitated in a crude form, which admits of easy purification.

Morphia combines with acids to form crystallisable salts, which are readily soluble in water and in alcohol. Of these, the *Hydrochlorate* (*Muriate*) and the *Acetate*, especially the former, are much used in medicine.

The therapeutic uses of morphia and its salts are very similar to those of Opium (q. v.); but the preparations of morphia are preferable to opium and laudanum in being less liable to occasion nausea and headache. The ordinary dose of morphia, or its hydrochlorate or acetate, when given to an adult to allay pain or induce sleep, ranges from a quarter of a grain to half a grain. The British Pharmacopœia which was first published in January 1864, and which superseded the London, Edinburgh, and Dublin Pharmacopœias, contains a solution of the hydrochlorate of morphia in which there is half a grain of the salt in one drachm of the solution; hence the ordinary doses of this solution range from 30 minims to a drachm. The pharmacopœia also contains morphia lozenges and morphia and opœacian lozenges, in each of which there is one-thirty-sixth of a grain of hydrochlorate of morphia.

**MORPHOLOGY.** See **METAMORPHOSIS OF ORGANS.**

**MO'RRIS-DANCE**, a peculiar and fantastic species of dance, commonly practised in the middle ages, and existing at the present day among the country people in several parts of England. Its origin is ascribed to the Moors, though the genuine Moorish dance (the *sandango* of the present day) bears little resemblance to it. The chief performer was the *hobby-horse*, so called from the light frame of wicker-work which was fastened round his body, and supplied with a pasteboard head and neck, so as to give him the appearance of a man on horseback. Bells were also attached to his ankles, and the great art consisted in so moving the feet as to produce a rude kind of concord. The other principal actors, after a rude fashion, personified the characters of Maid Marian, the Queen of the May, Robin Hood, Friar Tuck, the Fool, &c.; and the performance was accompanied by rude music, and the clashing of swords and staves, and was the chief amusement at parochial festivals.

**MORRISAN'IA**, a village of New York, United States, in Westchester County, on the New York and New Haven Railway, and about ten miles north of New York. It has been mostly built within the last twenty years, and is chiefly occupied by persons doing business in New York, to which it has been amalgamated.

**MORRISON**, Robert, D.D., the founder of Protestant missions in China, was born of Scottish parentage at Merpeth, in Northumberland, 5th January, 1782. He studied at one of the Independent colleges, and in 1805, he was sent to Macao and Canton by the London Missionary Society, to learn the Chinese language, and to translate the Bible into it. He reached Canton in September 1807, and in the course of a year was appointed translator to the East India Company's factory at Canton. By the year 1814 he had completed the translation and printing of the whole of the New Testament. Four years later, by the help of Mr (afterwards Dr) Milne, he had done the same with the Old Testament; and in 1822, he completed and printed his great "Chinese Dictionary" at an expense to the East India Company of £15,000. In 1816, he acted as interpreter to Lord Amherst. In 1818, he established an Anglo-Chinese College at Malacca for English and Chinese Literature, and for the propagation of Christianity. After a residence of 17 years in China, he returned to England in 1824, and brought with him a collection of 10,000 books in the Chinese tongue. In 1826, he returned to China. In 1834 he accompanied Lord Napier to Canton as interpreter, and died there 1st August. Besides the works already mentioned, he is the author of "Horse Sinice" (Lond. 1812), being translations from the popular literature of the Chinese; a "Chinese Grammar" (Serampore, 1815), and "Chinese Miscellany" (1825). In 1839, his widow published "Memoirs of the Life and Labors of Robert Morrison."

**MO'RRISTOWN**, a village of New Jersey, United States of America, on the Whippany River, and the Morris and Essex Railway, 23 miles west of New York, on an elevated plain, commanding a fine prospect. It has a court-house, 2 banks, 8 churches, and several literary institutions. Pop. (1870) 5674; (1890) 5418.

**MORSE**, Walrus, or Sea-horse (*Trichechus*), a genus of amphibious mammalia of the family *Phocidae*, agreeing with the rest of that family—the seals—in the general form of the body and limbs, but widely differing from them all in the head, which is remarkable for the enormous development of the canine teeth of the upper jaw, and the tumid appearance of the muzzle caused by the magnitude of their sockets, and by the thickness of the upper lip. These great canine teeth form two tusks directed downwards, and the lower jaw becomes narrow in front, so as to pass between them. There are no canine teeth in the lower jaw. The incisive teeth are small, six in the upper jaw, and four in the lower, mostly disappearing from adult animals. The molars—at first, five on each side in each jaw, but fewer in the adult—are simple, and not large; they have the crowns obliquely worn. The nostrils, as if displaced by the sockets of the tusks, open almost upwards, at some distance from the muzzle. The eyes are small; and the ears have no auricle, or, in popular language, there is no ear.—There is only one known species (*T. rosomarus*), sometimes called the **ARCTIC WALRUS**, an inhabitant of the Arctic seas and of the colder parts of the north temperate zone. It sometimes attains a size greater than that of the largest ox, and the tusks are sometimes two feet,

Morse  
Mortality

or even thirty inches long; but the ordinary length of the tusks is only about one foot. The M. is a gregarious animal, and is often seen in great herds, which sometimes leave the water to rest for a while either on the ice or on the land, where, however, their movements are very awkward and clumsy, and the hunter assails them with much greater prospect of success than in the water. Hundreds have thus been killed at one time, although the adventure is not without danger, as they must be assailed with spears, their hide being thick enough to resist even a rifle bullet. The M. uses its tusks for protecting itself or young from attack, for combating with its enemy the polar-bear, for aiding it in climbing upon ice; but principally, it is supposed, for tearing seaweed from submarine rocks; that being, there is every reason to think, the principal food of the animal, although it is supposed also to prey on molluscs, crustaceans, and other marine animals. The female M. shews great affection for her young, and will defend it to the last extremity; the young also remains beside the mother even after she is killed. When one of these animals is attacked, the rest of the herd—at least if in the water—hasten to its assistance. The M. is very capable of being tamed.—It is much sought after by the inhabitants of the most northern parts of the world for its skin, thongs of which seem to have been generally used in former times for ropes and cables—esteemed so valuable, that the Finlanders paid tribute in this article; whilst its oil—not very abundant—is employed like seal oil; and the tusks are very much valued as ivory, being superior in compactness to those of the elephant. The flesh is coarse, but is eaten by the Esquimaux. The young M. has not large tusks like the adult.

The M. has occasionally been seen on the British coasts, probably transported on icebergs from the north.

The name M. is from the Russian *Morsk* or Lapp *Morsk*. The name *Walrus* is Norwegian (*Heal-ros*, Whale-horse). Another Norwegian name is *Rosmar*, supposed to be from the Teutonic *ros*, horse, and *mar*, the sea.

MORSE, Samuel Finley Breese, LL.D., &c., American artist and inventor, was the eldest son of Rev Jedediah Morse, D.D., geographer, and was born at Charlestown, Massachusetts, April 27, 1791. He graduated at Yale College in 1810, and visited England with the American painter Washington Allston, to study painting with him and Benjamin West. In 1813, he received the gold medal of the Adelphi Society of Arts for his first effort in sculpture, the "Dying Hercules." Returning to New York in 1815, he became the first president of the National Academy of Design, and was appointed Professor of the Arts of Design in the university of the city of New York. He did not give his entire attention to art, but was interested in chemistry, and especially in electrical and galvanic experiments; and on a voyage from Havre to New York, in 1832, he conceived the idea of a magnetic telegraph, which he exhibited to congress in 1837, and vainly attempted to patent in England. His claims to priority of invention over Professor Wheatstone in England have been the subject of considerable controversy. See TELEGRAPH. He struggled on with scanty means until 1843, when, as he had almost yielded to despair, congress, at midnight, and the last moments of the session, appropriated 80,000 dollars for an experimental line between Washington and Baltimore. For his telegraphic inventions, M. was rewarded by testimonials, honors, orders of nobility, and wealth. Several European states joined in presenting him a purse of 400,000 francs, and banquets were given him in London and Paris. The recording instrument in use in America is his invention.

MORSHANSK, a district town in the centre of the government of Tambou in European Russia, 56 miles north of Tambov, is situated on the left bank of the Tena, a feeder of the Oka. Its population in 1867 was 19,819. M. is the port for shipment of the corn of the provinces of Simbirsk and Saratof, the shipments annually amounting in value to 5,000,000 rubles. There is also a large market for the cattle and sheep of the south-east provinces, the average annual supply being 90,000 cattle and 100,000 sheep; also for melted grease, of which 1,500,000 rubles worth is sent yearly to St Petersburg and Moscow. The trade of the town itself is of little importance, the chief establishments being soap-boileries, flour-mills, and sailcloth manufactories.

MORTALITY, Law of. While there are few future events the date of whose arrival is more uncertain than that of death to any one man, on the other hand, the

average duration of a multitude of human lives is found to be in accordance with a law which operates as surely as that of gravitation. If it be asked how many lives must we have, before we can depend on obtaining from them a duration equal to the general average, the only answer that can be given is, that the more we have the more nearly must we approach to this result; the fluctuation ultimately becoming so small as to be practically of no effect. So long ago as early in the 17th c., a certain John Graunt of London published what he called "Natural and Political Observations on the Bills of Mortality." This work has been called "the earliest movement in economical arithmetic, and the closest approximation to the data on which life-assurance is founded." About the same time, Sir William Petty gave to the world many curious calculations and speculations on the same subject. In 1698, Dr Halley published the Breslau tables of mortality, and this was the first work which really raised the subject to the rank of a science. Halley's speculations had, however, been preceded by those of Pascal in France, and of De Wit in Holland; and the latter famous man is probably entitled to be considered as the first who has applied the doctrine of probabilities to the valuation of life in the question of annuities. His treatise will be found in the second volume of the "Assurance Magazine." Halley's tables are printed in the "Philosophical Transactions" for 1693, No. 196. In 1713, J. Bernoulli's important work was published; and in 1742, Dr Price, availing himself of the principles laid down by Halley, and of data previously published by "John Smart of Guildhall, London, Gent.," gave tables of mortality for London. In 1744, M. Deparcieux published at Paris his "Essai sur les Probabilités de la Vie Humaine," in which he gave six valuable tables. In one of these, computed from the registers of different religious houses, it was shewn, for the first time, that female life is superior to male. In 1770, appeared the first edition of Price's "Observations on Reversionary Payments." The speculations of Buffon, Simpson, and De Moivre about the same time were of much importance. Mortality tables are tables shewing the operation of the law of mortality. The correct method of framing them is by analysing and collating accurate and sufficiently extensive statistics of life and death. They enable us to form a fair estimate of the number of human beings who will die at the end of a given period out of a given number alive at the beginning of it; and hence, the chance of life and death to the individual, and the mean duration of life at any age. Tables shewing the mean duration of life have been constructed in two ways: 1st. From statistics of deaths alone; and 2d, From statistics of life and death. By the first plan, they would be deduced as follows: Suppose, on searching a parish register, that we found recorded 100 deaths of children in their first year, we should assume that, on an average,  $\frac{1}{2}$  a year of life would have fallen to each. This gives 60 years of life among 100. If we found that 60 had died in their second year, assigning one year and a half to each, we should have  $60 + 1\frac{1}{2} = 90$  years among the 60; and so on for every age up to the oldest on the register. The sum of all the years enjoyed, divided by the numbers who have enjoyed them, will give the mean duration of life from birth; and the sum of all the years enjoyed after a given age, divided by the numbers who have enjoyed them, will give the mean duration at the given age; in both cases as nearly as the data enable us to give it; but the data are insufficient. Suppose we found by a register for 1873 that 100 children had died in their first year and one man in his 96th, it is plain that, to make this ratio a fair one, there ought to have been as many births in 1778 as in 1873. If there have been only half as many born at the former date as at the latter, then we must put two lives into the calculation to make it correct; and we must proportion our results similarly at all intermediate ages. Again, suppose four deaths at age 23 to be registered, we cannot tell how many of those born in 1850 may have emigrated from one parish, nor do we know how many born elsewhere in that year may have come into it. For the rule and formula for obtaining the mean duration of life under the second method, which is an absolutely certain one, see LIFE, MEAN DURATION OF. The following are the tables now most generally used by assurance and annuity offices in this country: I. The Northampton (Dr Price's). This table was framed by Dr Price from the register of burials in the parish of All Saints, Northampton, 1735-1780. Being constructed on deaths alone, it has, as was to have been expected, proved faulty. It gives the probabilities of life too low at the younger and middle ages; and those offices which still use it—and there are a good many—have some difficulty in keeping themselves right. II. The New Northampton (Nos. 1

and 2). These tables were constructed by Dr Farr. See Eighth Report of the Registrar-general for England, pp. 277—343. No. 2 is based on the deaths alone in Northampton during the seven years 1833—1844. In its results it agrees almost exactly with that of Dr Price. No. 1 was deduced from a comparison of the deaths during 1833—1844 with the census returns of 1841. It differs widely from No. 2 and from Dr Price. By the two latter, the mean duration of life is respectively found as 24.68 years and 25.13 years. By No. 1, it is 37.5 years. III. The Carlisle. This table was constructed from observations made by Dr Heysham at Carlisle, 1780—1787. It is now generally understood that the mortality in towns is understated at ages 15—35, owing to the immigration of healthy men and women from the country. Again, the female population of Carlisle was excessive during the period in question, and the extent of the observations was limited. Owing to these facts, this table gives rather too low a rate of mortality, and is a little irregular in its graduation. In a table prepared by W. T. Thomson, Esq., in a Report on the Ministers' Widows' Fund of the Church of Scotland, 1861, he shews that the lives of the Scotch clergy are about half a year better up to 44 than the Carlisle; at 45, they are equal; and at 45 to 80, they are half a year worse. Thereafter they vary. The widows are half a year better up to 61, equal at 62, and nearly so to the end. Probably the Carlisle gives a fair mortality rate for a healthily circumstanced population. IV. The Government. These were computed by Mr Finlaison on the lives of 22,000 nominees for government annuities. They are chiefly important as giving a view of the value of female life, but this view is one which differs widely from those given either by the "Experience" or by the "English" table. At age 20, for instance, the mean duration of female life is, by the Government table, 5½ years more than the male; by the Experience, it is 4 years less. In some measure this wide divergence may perhaps be accounted for by the fact that the Government results are deduced from annuitants, the Experience from assured lives. The experience of late years has, however, led to some modification in the relative values of male and female life in government tables. V. The English (Nos. 1, 2, and 3). No. 1 is deduced from the living by the census of 1841, and from the deaths at corresponding ages in the same year. See 5th and 6th Reports of the Registrar-general for England, where the tables will be found, and their construction explained. No. 2 is deduced from the living in 1841, and from the deaths in the seven years 1833—1844. No. 3 is deduced from the population in 1841 and in 1861, and on the deaths for the 17 years 1833—1854; male and female life being calculated separately and in combination. These "English" tables probably give the results of the average mortality of England more correctly than any others which we have. They are the result of enormous labor on the part of Dr Farr. The observations were taken on the plan recommended by Professor de Morgan and Mr Griffith Davies. VI. The Experience. These were prepared by a committee of eminent actuaries on the data afforded by the combined experience of 17 life-assurance offices. The objections to which they are liable are, that certain lives having been more than once assured have appeared twice or oftener as elements in the calculations; that the average term over which the observation of the offices extends is only eight and a half years; and it is probable that the mortality which will prevail in assurance societies when they have reached maturity is somewhat understated. See letter by Dr Farr in Appendix to 10th Report of Registrar-general, p. 11. Further, the data for old ages were deficient, and this of course affects the whole. Many curious results are brought out by this table. It shews that "town" assured life is superior to "country;" that female assured life is on the whole inferior to male; and that Irish life is worst of all. At age 20 "town" mean duration is 41 years, 3 months; country, 40 years, 4 months; Irish, 34 years, 11 months. The observations of the Standard Assurance Company do not, however, bear out these results; and they are doubtless so largely affected by the elements of *Care in Selection* as to render it impossible to found on them any conclusion of practical value. A new set of "Experience" tables was published in 1873, based on the mortality experiences of twenty offices, ten English and ten Scotch. They do not shew any widely different results from the former Experience tables. These form a very valuable set of tables. They give the results of English and Scotch experience united, and of Scotch separately.

In all tables deduced from the experience of assurance and annuity societies, the

TABLE SHOWING THE "MEAN DURATION" OF HUMAN LIFE, ACCORDING TO  
VARIOUS AUTHORITIES.

Age.	NORTH-AMPTON.		CARLISLE.		GOVERNMENT		ENGLISH LIFE TABLE.—DR FARR.				Experience of Twenty Of- fices. Male Life.	Age.	
	Male and Fe- male coun- bined. Dr Price.	Male and Fe- male coun- bined. Dr Heysham.	Female. Finnish, 1839.	Male.	Female.	Male and Fe- male coun- bined.							
0	25	2	83	9	55	6	40	2	43	2	41	2	0
10	89	9	43	10	51	1	47	1	47	10	47	5	10
20	33	5	41	6	44	0	39	11	40	10	40	4	20
30	23	8	34	4	37	7	33	2	34	8	33	8	30
40	23	1	27	7	31	1	26	6	27	9	27	2	40
50	18	0	21	1	24	4	20	0	21	1	20	7	50
60	13	8	14	4	17	4	13	7	14	5	14	0	60
70	8	7	9	2	11	0	8	6	9	0	8	9	70
80	4	9	5	6	6	6	4	11	5	2	5	1	80
90	2	5	3	3	2	10	2	9	2	10	2	9	90
100	0	0	2	2	0	6	1	6	1	6	1	6	100
	Both Sexes.	Both Sexes.	Female Life.	Male Life.	Female Life.	Both Sexes.							



fact of *selection* must not be lost sight of, either in using them for the sake of comparison, or as the basis of other tables. Actuaries, however, seem to be generally of opinion that the selection exercised by assurance societies does not really lower their rates of mortality below the general average; without selection, their rate would be above the general mean; for, it will be observed, that the public are continually selecting against the offices by offering inferior lives, and good lives often surrender their policies, while lives which have become bad hardly ever do so. Again, the value of medical examination gradually disappears, and in ten years at most it is quite lost. Five to seven years is indeed now held by the assurance offices to exhaust its value. See Minutes of the House of Commons' Committee on Assurance Associations, 1853; and Life-contingency Tables by R. J. Farren, pp. iil.—xiii. Though female life is, as a whole, undoubtedly superior to male, yet as there are more critical periods in it, it is probable that the public may more frequently select it than male life against the societies. A valuable report on the Madras Military Fund (London, 1863) gives tables constructed on the mortality rates prevailing among the officers, wives, and widows interested in the fund. As they have been, prepared by eminent men on very ample data, they will probably be very valuable to societies transacting business in India. We give a view of the mean duration of life, at the beginning and at each decennial period, according to the table mentioned above.

In the present article, we have considered the law of mortality, chiefly as it bears on insurance and other monetary transactions. The wider view of the subject, as varying with occupation and in different ages and countries, will be illustrated under the head of **VITAL STATISTICS**.

**MORTAR.** See **CEMENTS**.

**MORTAR**, a piece of artillery which differs from a cannon in the large diameter of its bore in proportion to its length, and in the circumstance that it is usually fired at a considerable angle, so that the projectile may strike the object aimed at in a direction more or less vertical. The object for which mortars are intended is the discharge of **LIVE SHELLS** (q. v.) or carcasses. As the projectile has a large diameter, and, except in rare instances, a very great range is unnecessary, a comparatively small charge of powder is requisite. To give this its utmost power and concentration, it is confined in a hemispherical chamber at the lower end of the bore, but of less diameter. The shell completely closes this chamber; and when the explosion ensues, receives its full force on its centre. In the British service, the ordinary mortars range in diameter of bore from 5 to 18 inches.

Larger mortars have, however, been tried at times, as at the siege of Antwerp Citadel in 1832, when the French brought one of 24-inches bore to the attack. This monster, owing to its unwieldiness and other causes, was a failure. Larger still than this, though perhaps more manageable, is Mr Mallet's great 36-inch mortar, constructed in 1853, of iron parts welded together, and now at Woolwich, rather as a curiosity than for use. As loaded shells are of immense weight, so heavy, indeed, as in larger calibres to involve the necessity of a strong apparatus to deposit them in their places, and the mortar is fired at high elevations, the recoil is so great and so nearly vertical that no carriage could withstand the shock; it is necessary, therefore, that the mortar should be mounted on a solid iron or timber bed, by the trunnions, which are placed behind the breech, and supported in front by massive blocks of wood. The arrangement renders the apparatus so heavy that mortars of large size are rarely used in field operations, their ordinary positions being in defensive or siege works, and in mortar-vessels.

More widely, however, are the Coehorn mortars, invented by the Dutch engineer of that name, for clearing the covert-way or ditch of a fortress. This mortar is sufficiently small to be managed by one man, and is accounted useful in siege or defence operations. The French use a similar Lilliputian ordnance under the denomination of *pierriers* or stone-throwers. Small mortars are likewise constructed for mountain warfare; a mule carries the mortar, another the bed, and a third is laden with the projectiles. The use of mortars is diminishing at the present time, elongated shells of great weight being now thrown from rifled cannon.

**MORTARA**, Edgar, a Jewish boy, whose case recently attracted great and painful interest throughout Europe. The facts are as follows: On the 23d of June 1858,

Signor Momolo Mortara, a manufacturer and wholesale merchant of cloth in Bologna, and by religious profession a Jew, returning home about ten o'clock at night, found his house in the possession of the police, who informed him that they had orders from Padre Felletti, inquisitor-in-chief at Bologna, to carry off his son, Edgar, who had been surreptitiously baptized into Christianity by a Roman Catholic maid-servant. The inquisitor was waited upon by some friends of the family a little after midnight, who implored delay. He informed them that he was acting under the orders of the Archbishop of Bologna, but consented to sist procedure till "next evening." The archbishop, however, was "absent" from the city, and next evening the papal carbiniers entered the house and "tore the child out of his father's arms." They carried him to Rome, where he was immured in a convent. The bereaved father immediately followed, obtained several interviews with Cardinal Antonelli, and offered to prove that the servant who said she had baptised Edgar had turned out to be a worthless prostitute, living in sin with Austrian officers. The cardinal declined to interfere, on the ground that the case did not come under his jurisdiction, and recommended Signor Mortara to apply to "the proper tribunals." After some weeks had passed, the child was removed to Alatri, whither his father and mother also went, and saw Edgar in a church among a number of priests, but had no opportunity of speaking to him. They returned to Rome, once more sought the presence of Cardinal Antonelli, and prevailed upon him so far that he ordered the child to be brought back to the city, and allowed his parents several times to converse with him. These interviews are described as agonising, and Edgar earnestly entreated his father and mother to take him home, but this of course was a hopeless request. He had been baptised, and baptism, no matter by whom administered, was an inviolable rite, which laid the Catholic Church under the solemn obligation of protecting its son from the snares of parental infidelity. It dared not give him up. Signor Mortara and his wife had to go away without their child. The case soon became known throughout Europe, and excited great indignation, more particularly in England. The Evangelical Alliance drew up a protest, which was signed by the Archbishop of Canterbury and above twenty other bishops, by a large number of peers, members of parliament, heads of colleges, and ministers of the gospel, by upwards of a hundred mayors and provosts, and by many other influential laymen. It was presented to Lord John Russell. The British Jews presented another. Nothing, however, was effected by these efforts. Edgar Mortara remained, of his own choice, the result would seem to prove, in the hands of the Roman Catholic Church authorities. He was educated for the priesthood, became an Augustine monk of the monastery Notre-Dame de Beauchêne, and preached his first sermon in 1874. The narrative, which created such excitement as echoed this boy's name over all the world, was at the time taken by the judicious as an *ex parte* statement; no authorised exposition of the facts, on the part of the Roman authorities, having ever been made public.

**MORTAR-VESSEL**, a class of gun-boat for mounting sea-service mortars, and in some cases provided with steam-power. The mortars are usually of the largest calibre, 13-inch. To enable the mortar to be properly manœuvred, and to resist the recoil from the nearly perpendicular explosion of so great a piece of ordnance, the vessel has considerable breadth in proportion to her length. The mortar is slung astidships in a massive bed. The ancient form of mortar-vessel was the "bomb-ketch," convenient because of the length of deck without a mast. The present vessel originated during the Russian war, and were found serviceable at the bombardment of Sveaborg.

**MORTGAGE**, in English Law, is the temporary pledging of land in security of a debt; and as the land cannot be delivered into the creditor's hand, he acquires a hold over it by a deed called an indenture, or deed of mortgage. The ordinary form of a mortgage-deed, resembles an absolute conveyance, but it contains a proviso that if the money borrowed is repaid within a certain time, then the mortgagee shall reconvey the land to the mortgager or borrower. There is a mode of executing a mortgage without any deed, which is common with bankers and others who lend money. This consists in the borrower taking the title-deeds of his land to the banker, who keeps the deeds and lends money on the faith of them. This is called an equitable mortgage by deposit of title-deeds, but in point of fact is as good as

any other mortgage. Mortgage deeds do not require in England to be registered, except in Middlesex and Yorkshire; and hence a person not unfrequently mortgages his property two or three times over, though the security is insufficient for all the debts. But in general this can only happen by the carelessness of one or other of the mortgagees, for the first mortgagee ought to have the title-deeds in his possession, and ought not to part with them, as they are his chief protection. A mortgagee can assign his mortgage security to another person, who thereupon stands in his shoes. If the money is not paid at the time originally appointed in the deed, then interest becomes due, and the deed is held as a security for both principal and interest. The remedy which the mortgagee has if the money is not paid at all, or not paid after due notice, is threefold. The mortgagee may exercise the power which the deed always contains to sell the estate and pay himself out of the proceeds. Or the mortgagee may enter into possession, and draw the rents and pay himself by instalments. Or he may foreclose the mortgage—i. e., he commences a suit in the Court of Chancery, the effect of which is to allow a short time to the mortgagor to pay the debt, failing which the court will order it to be sold to satisfy the debt. Another remedy is for the mortgagee to sue the mortgagor for the money in an ordinary action. All these remedies may be pursued at one and the same time. Sometimes when a second and third mortgage are given over the same estate, which is often done when the estate is large, compared with the money borrowed, it happens that the third mortgagee gets a prior title to the second mortgagee by buying up the first mortgage. On doing this, he can tack the third mortgage on to the first by the doctrine known as the tacking of mortgages. As a general rule, if nothing is said, the mortgagor or borrower pays all the costs of the mortgage transaction. Until the estate is sold, or the security foreclosed, the mortgagor has what is called the equity of redemption, i. e. he can at any time, on payment of the debt, compel the mortgagee to reconvey the property to him. Mortgages in England are not a first-class security, and hence trustees who are not specially authorised by their deed or will to invest in mortgage security do it at their risk, it being assumed that the only investment which is absolutely safe is government stock. In Scotland, mortgages are generally called bonds and dispositions in security, and form a higher and better security than in England, owing to there being a regular system of registration of deeds affecting land; and hence trustees are entitled to invest their funds there in mortgage security, which is considered as safe as government stock, and less liable to fluctuations of interest. In Scotland, there is no such practice as mortgaging lands with banks by merely depositing the title-deeds. See **BOND, DISPOSITION IN SECURITY.**

**MORTIFICATION**, in Scotch Law, is a term used to denote lands given for charitable or public uses. When lauds are so given, they are in general formally conveyed to the trustees of the charity, to be held *bleuch*, or in *feu*. When mortifications are given in general to the poor, without naming particular trustees, they fall under the administration of the Court of Session. By the statute 1683, c. 6, it was declared unlawful to alter any mortifications, and the managers were rendered liable to be called to account for malversation. Any person entitled to the benefit of the fund can pursue actions of this kind.

**MORTIFICATION**, in Medicine. See **INFLAMMATION.**

**MORTIS CAUSA DEED**, in Scotch Law, is a deed which is made with a view to come into effect on the death of the maker. Since in Scotland land cannot be conveyed by will, as in England, it is necessary to execute an ordinary deed of conveyance, and to reserve the maker's liferent, and to keep it in his own possession until his death—i. e., to suspend its effect during the life of the grantor.

**MORTISE AND TENON** (Fr. *mortaise*, probably from Lat. *mordere*, to bite; *tenon*, from *tenir*, to hold), a form of joint in Carpentry. The tenon is a projection, generally rectangular in form, on the end of a piece of wood, cut so as to fit exactly into a deep groove (called the mortise) cut in another piece, so that the two are united at a required angle. The framing of doors, shutters, and such pieces of joinery, is usually fitted together with mortise and tenon joints.

**MORTMAIN**, the Statutes of (Fr. *mort*, dead, and *main*, hand). The object of the statutes of mortmain is to prevent priests and other persons from importuning a

dying man to convey his land for charitable purposes. Hence, though a person can, up to the last hour of his life, if possessing sufficient knowledge of what he does, devise by will all his land to individuals absolutely, it is otherwise if he intend to give the land to trustees for a charitable purpose, as to build a church, or school, or hospital. The statute of mortmain, 9 Geo. II. c. 36 (1736), reciting that public mischief had greatly increased by many large and improvident dispositions made by tanguishing and dying persons to charitable uses, to take place after their deaths to the disinherison of their lawful heirs, enacted, that in future no lands or sums of money to be laid out in land should be given to any person or body, unless such gift or conveyance should be made or executed in presence of two witnesses twelve months before the death of the donor or grantor, and be enrolled in the Court of Chancery within six months after the execution. Therefore, a person on death-bed cannot in England give land, or money to buy land, for a charitable purpose. It can only be done in the life of the donor, at least twelve months before his death; and the property must be completely alienated, so that he has no further control over it. The deed must have a present operation, and must not reserve any life-interest to the donor; it must be done at once and for ever. The policy of this statute has sometimes been questioned, and several well-known modes evading the statute have been adopted from time to time. The act has been held to apply only to land locally situated in England; and hence, if the land is situated in Scotland, or the colonies, or abroad, a will conveying it for charitable purposes will receive effect. In Scotland, the mortmain act had no application; but it was not needed, as the common law of Scotland also put a similar check on the alienation of land on death-bed, which, however, has been abolished by statute. See **DEATH-BED, ILTESTACY**.

**MORTON**, Samuel George, M.D., an American physician and ethnologist, son of an Irish emigrant, was born in Philadelphia, January 28, 1799. He studied medicine in Philadelphia, Edinburgh, and Paris, and in 1824 settled in Philadelphia, where he contributed papers on physiology and craniology to scientific journals. In 1824, he visited the West Indies, and made observations on the development of races. In 1829, he was appointed Professor of Anatomy in the Pennsylvania Medical College, and published his great work, "*Crania Americana*," based on his collection of 867 classified skulls. In 1844, he published "*Crania Egyptiaca*," based on the collection of George R. Gliddon, Esq.; and in 1849, his last work, "*An Illustrated System of Human Anatomy, Special, General, and Microscopic*." He died at Philadelphia, May 18, 1851. M. may be regarded as the first American who endeavored to place the doctrine of the original diversity of mankind on a scientific basis. See the Memoir of M. prefixed to Nott and Gliddon's "*Types of Mankind*" (Philadelphia, 1854), a work largely illustrated by selections from his unedited papers.

**MORTON**, Fourth Earl of (James Douglas), regent of Scotland, was the second son of Sir George Douglas of Pittendreich, and in 1558 succeeded, in right of his wife, Elizabeth, daughter of the third earl, to the title and estates of the earldom. He early favored the cause of the Reformation, and in 1557 was one of the original Lords of the Congregation. Sworn a privy councillor in 1561, he was appointed Lord High Chancellor of Scotland, January 7, 1563. Having been one of the chief conspirators against Rizzio, the Italian secretary of Queen Mary, on his assassination, 9th March 1566, he fled with his associates to England, but, through the interest of the Earl of Bothwell, soon obtained his pardon from the queen. Though privy to the design for the murder of Darnley, on the marriage of the queen to Bothwell, he joined the confederacy of the nobles against her. He was present at Carberry Hill, when Bothwell parted from the queen, and after Mary's imprisonment in the Castle of Lochleven, he was restored to the office of High Chancellor, of which he had been deprived, and constituted Lord High Admiral of Scotland. On the death of the Earl of Mar, in October 1572, he was elected regent of the kingdom. His rapacity and avarice made him obnoxious to many of the nobles, and as the young king, James VI., desired to assume the reins of government, Morton resigned the regency in March 1578. Subsequently obtaining possession of the castle of Stirling, with the person of the king, he recovered

Mosaic  
Mosaicisms

his authority, but was accused of participating in the murder of Darnley, and being tried and condemned, was beheaded at Edinburgh, June 2, 1561.

**MOSAIC**, the art of producing artistic designs by setting small square pieces of stone or glass of different colors, so as to give the effect of painting. Both the origin of the art, and also of its name, are buried in obscurity; it was, however, much practised by the ancient Romans, especially for ornamental pavements, specimens of which are almost always found whenever the remains of an old Roman villa are discovered. Under the Byzantine empire, it was also much used for the ornamentation of churches, in which it formed a large portion of the wall-decoration. It was re-introduced into Italy for the latter purpose about the middle of the 13th c. by Andrea Tafi, who learned it of some Greek artists employed at Venice in decorating St Mark's. Since then it has been especially an Italian art, and to such wonderful perfection has it been brought, that most minute pictures are produced by it. Within quite recent years, mosaics of surpassing beauty, both in design and material, have been produced by Russian artists in the Imperial Glass Manufactory of Russia; those shewn in the Russian department of the International Exhibition (1882) have probably never been surpassed. The pieces of glass of every shade of color are technically called *smalts*; they are generally opaque, and are set in cement in the same manner as tiles or pavement. Some fine pieces of mosaic pavement have lately been produced in this country by Messrs Minton & Co., of Stoke-upon-Trent, and by Messrs Maw of Brosely, proving that the art only wants sufficient encouragement to obtain a high position. In Italy there are two very distinct varieties of mosaic work—i. e., the Florentine and the Roman; the former is entirely formed of pieces of stone or shell of the natural colors, and is limited in its application chiefly to floral and Arabesque designs. The latter is made of the glass *smalts* mentioned above, and has so wide an application, that most of the finest paintings of the best old masters have been copied in mosaic, and the pictures so taken form the almost imperishable decorations of the finest churches of Italy. The manufacture of the opaque glass or *smalts* for making the little square pieces called *tesserae*, of which the pictures are composed, is a very important one, and is carried on in the Vatican, where 25,000 shades of the various kinds of colored glass are produced.

**MOSAIC GOLD.** See TIN.

**MOSAIC WOOL**, or Wool Mosaic, is a remarkable application of the principle of mosaic-work to the production of woollen or worsted rugs and carpets, having a definite design or pattern, independent of the ordinary processes of printing and weaving. Many attempts in this direction have been made, chiefly on the continent; but the most successful is that of Messrs Crossley, in whose extensive carpet factory at Halifax the mosaic wool is produced as a regular department of manufacture.

In the first place, well-spun worsted threads are dyed to every color and almost every shade or tint, amounting to a hundred varieties in all. An artist prepares a full-sized drawing of the pattern or design, ruled all over with cross-lines; this is copied on lined paper by girls, each of whom takes as much of the pattern as will fill a square foot. A workman (or woman) having a good eye for color, examines each square piece of drawing in detail, and selects the proper color of thread suitable to every portion of it; the threads are a little over 200 inches long each, or about 17 feet, and are numerous enough to pack closely together into a mass of one square foot in width and depth. A strong iron framework, 17 feet long, is so arranged that all these threads can be stretched on it horizontally, tied at one end, and weighted with 4 lbs. to each thread at the other. Girls, under the direction of the work-woman who selects the colors, arrange these threads one by one, tying them at one end, weighting them at the other, and supporting them on a steel bar in the middle. This being done, the mass of 17 feet in length is cut up into blocks of 20 inches long each, for convenience in after-operations. All these processes are for one square foot only of the pattern, and they have to be repeated as many times as there are square feet in it. Supposing a rug 6 feet by 2, with a lion, tiger, or other device occupying the greater part of the surface: there must be twelve masses prepared, and as each mass contains 50,000 threads, there will be 600,000 altogether. Blocks are cut from each mass, and are placed in an iron box or frame, side by side; thus forming a quadrangular solid 6 feet by 2, and 20 inches deep, with the threads arranged *vertically*. Now, to convert this into a great number of separate rugs, the pattern of which is

seen represented on the upper surface, formed by the ends of the colored threads, india-rubber is dissolved in camphine to the consistence of carpenters' glue, and brushed well over the top, so that every individual thread shall receive its portion; this being dried, a second coating is applied, and afterwards a third. A backing of canvas, or of some kind of strong cloth, is cemented down upon the mass of threads by a glue of the same kind, and is scraped and rubbed until it adheres to every individual fibre. When dry, the mass of threads is raised up three-sixteenths of an inch, by a screw acting upon a movable bottom to the box. A very keen circular cutter, 12 feet in diameter, and rotating 170 times per minute, quickly severs a horizontal slice three-sixteenths of an inch thick, the box of threads being caused by an endless screw to travel onwards to meet the cutter. This slice, when turned up, presents the picture complete, in a beautifully soft nap or pile of woollen threads, supported by a canvas or woollen backing. It is a mere question of hand-work to convert this into a rug, carpet, coverlet, or wrapper of any kind. A second repetition of the same processes converts another slice into a second rug; and so on until the mass of 20 inches in depth has been cut up into about a hundred slices, each forming one rug. As the blocks of 20 inches were originally cut from a mass of 200 inches, the whole mass produces about a thousand rugs, all exactly the same pattern. It is this power of repetition which makes the process pay; for the great preparatory labor of selecting and arranging (say) 600,000 distinct threads could not otherwise be compensated for.

MOSAYLIMA (Little Moslem), one of the most important rivals of Mohammed, belonged to the clan Dûl, a division of the tribe of the Bani Hanifah, of Yamâma in Nedjed. The traditions about his life and age are extremely contradictory and legendary. It appears, however, tolerably certain that he had risen to a certain eminence in his tribe, probably as a religious teacher only at first, before Mohammed assumed his prophetic office. The name he was known by among his friends was Rahmân, the Benignant or Merciful; a term which Mohammed adopted as a designation of God himself. This word, which is *Armaic*, was a common divine epithet among the Jews, from whom Mohammed took it, together with a vast bulk of dogmas, and ceremonies, and legends. If, however, M., as is supposed by some, assumed that name in the meaning of Messiah, Saviour, it would prove that he had anticipated Mohammed in the apostleship, which is commonly denied. It was in the ninth year of the Hedjrah that M., at the head of an embassy sent by his tribe, appeared before Mohammed, in order to settle certain points of dispute. The traditions are very contradictory on the circumstance whether or not M. was then already the recognised spiritual leader of his tribe. When they were introduced to Mohammed in the mosque, they greeted him with the orthodox salutation of Moslems—viz., "*Salâm alayk*" (Peace upon thee), and after a brief parley, recited the confession of faith. Shortly after this event, M. openly professed himself to be a prophet, as well as Mohammed. The latter sent a messenger to him, as soon as he heard of this, to request him to reiterate publicly his profession of Islam. M.'s answer was a request that Mohammed should share his power with him. "From Mosaylima, the Apostle of God," he wrote, according to Abufeda, "to Mohammed, the Apostle of God. Now let the earth be half mine, and half thine." Mohammed speedily replied: "From Mohammed, the Apostle of God, to Mosaylima, the liar. The earth is God's: He giveth the same for inheritance unto such of his servants as He pleases, and the happy issue shall attend those who fear Him." Yet notwithstanding these testimonies, of probably late dates, it seems, on the other hand, perfectly certain that Mohammed made very great concessions to his rival—concessions that point to his having secretly nominated M. his successor, and that he by this means bought M.'s open allegiance during his lifetime. It was not a question of dogmas, though they each had special revelations, but a question of supremacy, which was thus settled amicably. "Mohammed," M. said, "is appointed by God to settle the principal points of faith, and I to supplement them." He further had a revelation, in accordance with Mohammed's: "We have sent to every nation its own prophet," to the effect: "We have given unto thee [M.] a number of people; keep them to thyself, and advance. But be cautious, and desire not too much; and do not enter into rival fights."

When Mohammed was at the point of death, he desired to write his will. Whatever he may have wished to ordain, is uncertain; it is well known, at all events, that his friends did not obey his order, and refused to furnish him with writing-

materials, very probably because they did not like to be bound by his last injunctions. Sprenger supposes that he wished formally to appoint M. his successor, and that it was just this which his surrounding relations feared. M. then openly declared against Islam, and many parodies of the Koran sprang up in the Nedjed, ascribed to him. In the 11th year of the Hedjrah, it at last came to an open breach between the two rival powers. Abu Bekr, the calif, sent Khalid, "the Sword of the Faith," with a number of choice troops, to compel M. to submission. M. awaited the enemy at Rowdah, a village in the Wadi Hanifah. So formidable indeed was M.'s force, that Walid is said to have hesitated for a whole day and night before he undertook an assault unanimously disapproved of by his council. On the second morning, however, he advanced, and in a battle which lasted until the evening, contrived, with fearful losses of his own, to gain the victory. M. fell by the hands of a negro slave, and his head was cut off by the conqueror, and placed at the head of a spear, to convince both friends and foes of his death. Khalid then advanced to the slain prophet's birthplace, in order to slay all its inhabitants. They, however, by a clever stratagem contrived to conclude an honorable peace, but had to embrace Islam. The Mosleyman "heresy" was thus stamped out, and only a few scattered remnants of the new faith contrived to escape to Hassa and Basrah, where they may have laid the foundation of the later Karimathian creed.

It is extremely difficult to come to any clear notion of M.'s real doctrines, as all the accounts that have survived of them come from victorious adversaries—adversaries who have not hesitated to invent the most scandalous stories about him. Thus, a love-adventure between M. and the prophetess Sajjah, the wife of a sooth-sayer of Yamama, who is supposed to have stayed three days in his tent, is told with great minuteness, even to the obscene conversation that is supposed to have taken place between them during that time; the fact being that this story, which is still told with much relish by the natives, is without the slightest foundation. From the same source, we learn that M. tried to deceive his followers by conjuring tricks. It seems, on the contrary, that M. was of much higher moral standing than Mohammed himself. Thus, he is said to have enjoined the highest chastity even among married people: unless there was hope of begetting children, there should be restriction of conjugal duty. Even the nickname "Little Moslem," given to him seems to indicate that he, too, preached the unity of God, or Islam, as the fundamental doctrine of faith. How far his religion had a socialist tendency, and offered less show of dignity and outward morality to its followers, or whether it rejected fatalism, contained an idea of incarnation, and invested its preachers and teachers with a semi-mediatorial character, as the latest explorer of the Nedjed, Mr Palgrave tells us, we have no means of judging. But we must receive these conclusions, probably drawn from the information of the natives, with all the greater caution, as that story of the prophetess Sajjah, whom he reports, after his informants, not only to have been properly married to M., but to have, after his death, become a devout partisan of Islam, and to have entered an "orthodox alliance," does not, as we said before, deserve the slightest credence.

MOSCOW, an important government of Central Russia, lies immediately south of the governments of Tver and Vladimir. Area, 12,553 sq. m.; pop. (1870) 1,772,024. The surface is level with the exception of a tract in the south-west, which is elevated. It is watered by the Moskva and the Klazma, while the Oka forms a portion of its southern boundary. The soil, principally clayey, with some sandy and stony tracts, is, on the whole, unfertile, and barely supplies local consumption. Few of the governments of Russia, however, equal that of M. in manufactures and general industry. It contains numerous cloth, silk, brocade, chintz, paper, and other factories. China-ware is manufactured from the clay dug up in the district of Gjelak. Many of its villages carry on special branches of manufacture, of which pins, glass beads, and small looking-glasses for Asia is one. White limestone is quarried, and is much used for building in the capital; yellow marble quarries occur on the banks of the Oka. Peat is extensively used as fuel in the factories. Among the places historically celebrated are the monastery of St Sergius, founded by one of the first Muscovite princes, and famous for its silver shrine, said to be the richest in the world; and the village of Borodino (q. v.).

MOSCOW (Russ. *Москва*), the ancient capital of Russia, and formerly the real-

dence of the Czars, is situated in a highly-cultivated and fertile district on the Moskva, 400 miles south-east of St Petersburg, with which it is in direct communication by railway. Lat.  $55^{\circ} 40'$  n., long.  $37^{\circ} 33'$  e. Pop. (1871) 601,970. Previously to its being burned in 1812, M. was perhaps the most irregularly built city in Europe, and that distinction to a great extent it still retains; for, as the main object in 1813 was to build speedily, the streets rose again on the old model, undulating and crooked, and consisting of alternating houses, the most varied in character and pretensions. Many improvements have, however, been recently accomplished in the city. Gas-pipes have been laid along the streets; letter-boxes are placed at frequent intervals; the Romanzoff Place, formerly so dirty, has been converted into a splendid square, with an ornamental garden, and the old obelisk, the former monument of the Place, standing in the centre, with water fountains on each side. The general view of the town, especially that obtained from an eminence on its southern side called the Sparrow Hills, is eminently original and picturesque. Its hundreds of churches and convents, surmounted by gilt or variously-colored domes; its gardens and boulevards; and, above all, the high walls and crowded yet stately towers of the Kremlin or citadel, produce a most striking effect. The Kremlin, situated on the northern bank of the river, forms the centre of the town, and around it, with a radius of about a mile, is a line of boulevards, extending, however, only on the north side of the river. Outside of this line, and concentric with it, is another line of boulevards, with a radius of a mile and a half; while beyond all, and forming the girdle of the city, is the outer rampart, with a circumference of 26 English miles. The Kremlin comprises the principal buildings, as the Cathedral of the Assumption of the Virgin, founded in 1326, a small but gorgeously-decorated edifice; the Cathedral of the Archangel Michael, containing the tombs of all the Czars down to the time of Peter the Great, who changed the royal burial-place to St Petersburg; the Church of the Annunciation, the floor of which is paved with jaspers, agates, and carnelians of various shapes; the tower of Ivan Veliki, 200 feet in height, and surmounted by a magnificent gilded dome, from which, as from all the domes of M., rises the "honorable cross;" the Czar Kolokol (king of bells), the greatest bell in the world; several palaces, and collections of ancient arms and other antiquities; the arsenal, surrounded by the splendid trophy of 860 cannons, taken from the French; and the senate. The walls of the Kremlin are surmounted by 18 towers, and pierced with 5 gates. In the town, the chief buildings are the cathedral of St Vassili, remarkable for its peculiar architecture; the Gostinui Dvor, or Bazaar; and the Exchanges. The Temple of the Saviour, which was commenced in 1812, to perpetuate the memory of the repulse of the French invasion, is not yet completed; but when finished it will be a magnificent architectural feature of this ancient capital. The university of M., the first in Russia, founded in 1758, is attended by 1800 students, and contains a library of 160,000 volumes, museums of natural history, and a botanical garden. As intermediate educational establishments between the parish schools and the university, there are provided 5 high schools or gymnasia for males, and 3 for females; special establishments are the technological, the agricultural, the oriental, 2 commercial, and 3 military schools. There are several learned societies in M., which is also the seat of a metropolitan, one of the three highest dignitaries of the Russian Church. The public museum and library, which was removed from St Petersburg in 1861, occupies a large and handsome building. formerly a palace, is rich, especially in ancient Slavonic MSS., and has about 500,000 vols.

M. communicates by railway with St Petersburg, Nijni-Novgorod, Koslov, &c. It is the seat of an extensive manufacturing and commercial industry; it imports largely, and carries on a considerable export trade, especially with Asia. Its trade is chiefly in hides, leather, oils, wool, grease, isinglass, wax, honey, feathers and down, potash, soap, iron, and copper; cotton from Asia, silks from Georgia, Persia, and Bokhara; Caucasian madder, home and Turkish tobacco, furs, tea, chemicals, and all the products of Russian manufacture, of which M. is the actual centre. The chief manufactures are woollen and worsted goods, silks, brocades, dyeing, printing, tanning and skin-dressing, iron, copper, and silver works, and chandeliers.

M. is of ancient origin for a Russian town. Its site was bought by Yuri Dolgoruki, in the 13th c., and a fortress built. In the 14th c., not only had it become the capital of the Russian religious world, owing to the residence there of the metro-



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politan, but it had also become the actual capital of Muscovy. In 1368, 1370, and 1372, it suffered from the inroads of the Lithuanians; in 1381, it was sacked by the Tartars. From 1413 to 1501, it was, on four separate occasions, partially destroyed by fires; and it was burned to the ground by Devlet-Girey, Khan of the Crimean Tartars, in 1571. It was taken by the Poles in 1610, and remained in their possession till their expulsion by the Russians under Minin and Pojarsky in 1612. In 1652, 1659, and 1698, it was the theatre of the revolts of the Strelitz. In 1812, from the 14th September till the 24th October, it was in the hands of the French.

MOSELLE was formerly a frontier department in the north-east of France, but the greater part of it was taken by Germany after the war of 1870—1871. The small portion left to France was joined to the department of Meurthe. Population of M. in 1866, 452,157. It is watered by the Moselle and its tributaries; is richly wooded, and yields abundance of grain, fruits, and wine, though the last is of an inferior quality. Agriculture is in an advanced condition; roads are numerous, and the river-navigation important. Coal, iron, and building-stone are the most valuable minerals. There are also linen, woollen, leather, glass, papier-mâché, and other manufactures.

MOSELLE (Ger. *Mosel*), an affluent of the Rhine, rises in the Vosges Mountains, France, at an elevation of about 2200 feet above the level of the sea, not far from the sources of the Saône. Its course is north-westerly as far as Pont-à-Mousson, in the department of Meurthe, where it becomes navigable; then north to Thionville, near the French frontier; after which it proceeds, in a north-easterly direction (latterly, with many zigzag picturesque windings), through Luxembourg and Rhenish Prussia, joining the Rhine at Coblenz. On its way, it passes the towns of Remiremont, Epinal, Toul, Pont-à-Mousson, Metz, Thionville, and Treves. From Metz to Treves it flows through a broad valley, enclosed by rounded vine-bearing hills. Its entire length is upwards of 380 miles. Its principal tributaries are the Meurthe, the Seille, and the Sarre on the right; and the Orne, the Sure, and the Kyll on the left. The wines grown in the basin of the Moselle are noted for their lightness and their delicate aromatic flavor. The inferior kinds are liable to acidity.

MO'SES (Heb. *Môshêh*; LXX. and Vulg. *Moyse*; ? Egypt. *Mes* or *Measou*; Copt. *Mo usha*, i. e., drawn out of the water), prophet and legislator of the Israelites, born about 1600 B.C. in Egypt (? Heliopolis), during the period of their hard bondage. His father was Amram, his mother Jochebed, both of the tribe of Levi. The tale of his birth and early education has, by tradition (Manetho, Philo, Josephus, Midrash, &c.), received a much more extraordinary legendary character than is found in Exodus; while the main features are, on the whole, the same in them all. And there is no reason to doubt the truthfulness of an account which shews us M., like many other supreme benefactors and "suns" of mankind, struggling against an apparently adverse fate, nay for very life, from the instant of his birth. The well-known narrative, to which late traditions (contained in Philo, Josephus, the Fathers, &c.) have supplied questionable names and dates, is that M.'s mother, unable to hide the child—which was to have been drowned at its birth—longer than for the space of three months, put it into a basket of papyrus, and hid it among the Nile rushes, Miriam, his sister, watching it from afar. The king's daughter (Thermuthis, or Meris), coming down to the river, observed the weeping child, and was so struck with its beauty, that she allowed Miriam to fetch a Hebrew nurse, Jochebed. Grown up, he was sent to the king's palace (Heliopolis) as the adopted son of the princess, and here seems to have enjoyed not only princely rank, but also a princely education. He is also said to have become a priest, under the name of Osarsiph or 'Iethen, and to have been a mighty adept in all the sciences of "Egypt, Assyria, and Chaldaea;" to have led Egyptian armies against the Ethiopians, defeated them, and pursued them to their stronghold, Saba (Meroe); this place being delivered into his hands by Tharbis, the king's daughter, whom he subsequently married. The Bible contains nothing whatever about the time of his youth. He first reappears there as the avenger of a Hebrew slave, ill-treated by an Egyptian overseer. Threatened by the discovery of this bloody act, he escapes into Midian, where he is hospitably received by Jethro, the priest, and married his daughter, Zipporah. He stayed for many years in Midian, tending the flocks of his father-in-law. This most sudden transition from the brilliant and refined life of an Egyptian court, of which

he had been brought up a prince, to the state of a poor, proscribed, exiled shepherd, together with the influences of the vast desert around him, must, in M.'s mind, have produced a singular revolution. The two names which he gave to his sons, strikingly express part of what filled his soul—a feeling of gratitude for his salvation from the avenging hand of justice, and the deep woe of his exile. The fate of his brethren went now to his heart with greater force than when he was a prince and near them. There rushed upon his memory the ancient traditions of his family, the promises of Jehovah to the mighty sheikhs, his forefathers; that they should become a great and a free nation, and possess the ancient heritage of Canaan; why should not he be the instrument to carry out this promise? The *Ehye asher Ehye* (I am that I am) appeared to him while his mind was occupied with such thoughts, and himself put the office upon his shoulders. A new king had succeeded in Egypt, his old enemies were either dead or had forgotten him, and M. returned to Egypt. Together with Aaron, his brother, the man of small energy but of fine tongue, he consulted about the first steps to be taken with the king as well as with their own people:—both of whom treated them at first with suspicion, nay, with contempt.

After ten distinct plagues (more or less akin to natural phenomena peculiar to Egypt), the last being the death of all the firstborn, Pharaoh consented to let his slaves go free, "that they might serve their God." M. very soon had occasion to prove that he was not only the God-inspired Liberator of his people, who, in the enthusiasm of the moment had braved the great king and his disciplined armies, but that he possessed all those rarer qualities which alone could enable a man to mould half-brutalised hordes of slaves into a great nation. Calmness, disinterestedness, patience, perseverance, meekness, coupled with keen energy, rapidity of action, unflinching courage—"wisdom in council and boldness in war,"—constituted the immense power which he held over the hundreds of thousands who knew no law in their newly-acquired liberty, and who were apt to murmur and to rebel on any or no provocation. Nor were the hostile Bedouin tribes, whose territories the new emigrants approached, easily overcome with untrained warriors, such as formed the ranks of M.'s army. The jealousy of certain elders fostering seditious within, added to his unceasing vexations; and to all the measure to overflowing indeed, his own brother Aaron, whom he had made his representative during his temporary absence on the Mount of Sinai, himself assisted in the fabrication of an idol. His sacred office as legislator, he in reality first assumed in the third month after the Exodus, when, after many hard and trying marches and countermarches—from Goshen to Succoth (? Latopolis, the present old Cairo); thence by a *detour*, to Etham (? Ramleh), Pi-hachiroth (? Bedra), through the Red Sea, to the Desert of Shur (? Al-Djofar), Marah, Elim (Wadi Gharaudel), Desert of Sin (Wadi Mocattib), or (Wadi Al-Sheikh), Dophka, Alus, Raphidim (near the Makkad Sidna Moussa)—made more trying by want of food and of water, by encounters with Pharaoh and the Amalekites, having arrived near the Mount of Sinai, he made the people encamp all round, and ascended the summit of the mountain by himself. On the incidents connected with the "Revelation" made to the whole people, we need not dwell any more than on any other part of this well-known narrative. Suffice it to point out briefly, that the tendency of the whole Law was to make the Hebrews a people "consecrated to the Lord," "a holy people, and a kingdom of priests," i. e., a people of equals both before God and the Law. Three distinct parts compose this Mosaic Constitution. The doctrine with respect to God and His attributes; the "Symbolical" Law, as the outward token of His Doctrine; and the Moral and Social Law. The Decalogue forms a kind of summary of all the three; the existence of Jehovah as the Absolute Being, the liberation of the people and the prohibition of Polytheism, and the Representation of the Divinity by visible images (I—iii.). While the institution of the Sabbath, the symbol of creation and the Creator, forms the basis of all religious observances (iv.), the remaining part of the laws relate to the intercourse among the members of the human commonwealth; the gratitude of children is inculcated; murder, adultery, theft, false witness, coveting of others' goods are prohibited. The groundwork of these regulations had indeed been a special inheritance in the family of the Abrahamites from the earliest times; but the vicissitudes of fortune, the various migrations, and the enormous increase of this family, and its being mixed up for long years with the surrounding idolaters,

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had obliterated nearly all traces of the primeval purity of creed in the populace. The wisdom displayed even in the minor regulations of the Mosaic dispensation, with respect to their adaptation to the peculiarity of the race, the climate, the political state of the country which they were to inhabit; in the hygienic regulations, and the rules which treat of the social and domestic relations; and, above all, the constantly-reiterated caution from mixing again with other nations, such as they found them in Canaan—and the neglect of which subsequently proved their ruin—is traced to a direct influence of Jehovah, generally indicated by the words, "And God spake to Moses, speak unto the children of Israel." An ample Ritual, in connection with the Tabernacle, or constantly-visible symbol of a Divine Dwelling; the allegory of an ever-new covenant represented by Sacrifices, Prayers, Purifications, kept the supreme task of being priests and a holy people unceasingly before the eyes of the nation. The tribe of Levi (q. v.), to a certain degree acted in this respect as permanent representatives; and not to Moses's sons, but to his brother Aaron and his descendants, was intrusted the office of High-priest.

When on the eve of entering into the promised land, the people broke out in open rebellion, and threatened, by a spontaneous return to the land of slavery, to undo the entire work of M.'s life. Convinced that they were not as yet fit to form a commonwealth of their own, the Liberator and Lawgiver had to postpone, for the long space of 40 years, the crowning act of his work; and, in fact, did not himself live to see them taking possession of the hallowed territory. How these years of nomadic journeying through the Desert (El-Tyh or Al-Tyh Beni-Israel) were spent, save in rearing up a new generation of a more manly and brave, as well as more "civilised" stamp, we can only conjecture. All those who had left Egypt as men were doomed to die in the desert, either by a natural death, or by being suddenly "cut off," in consequence of their openly defying M., and through M., Jehovah. The apparent lack of incidents during this period has indeed furnished grounds for various speculations on this subject, and critics have tried to reduce it to a much shorter space, without, however, being able to prove their point. Even Goethe, with more ingenuity than knowledge of the subject, has endeavored to prove the "forty" to be a mythical round number, the real time being two years. The testimonies of the Hebrew prophets and historians, however, are perfectly unanimous on the subject (cf. Jos. v. 6; xiv. 10; Amos, ii. 10; v. 26; Ps. xcv. 10, &c.), and modern criticism has mostly endorsed the number as in keeping with the circumstances. On the first month of the fortieth year after the Exodus, we find M. at the head of an entirely new generation of Hebrews at Kadesh, in the Desert of Phoran or Zin. Here his sister Miriam died. Here also, for the first time, M., seeing the new generation as stubborn and "hard-necked" as their fathers, is recorded to have despaired of the Divine Providence; and his disobedience to the letter of the command given to him, "to speak to the rock," is alleged as the reason "that his bones too had to fall in the desert." His brother Aaron died at Hor (near Petra, according to Josephus and St Jerome), whither the Israelites had gone next. Not long afterwards, M. once more had occasion to punish with relentless severity the idolatrous tendencies of the people (Baal Peor), thus shewing that age had had no power of making him relax his strong rule over the still half-savage and sensuous multitude. Having finally fixed the limits of the land to be conquered, and given the most explicit orders to Joshua, to Eliezer, and the chiefs of the ten tribes respecting its division, he prepared the people for his own impending death. He recalled to their minds in the most impressive language, their miraculous liberation, and no less miraculous preservation in the desert. Their happiness—their life—was bound up, he told them, in the divine Law, communicated through him by Jehovah. A recapitulation of its principal ordinances, with their several modifications and additions and reiterated exhortations to piety and virtue, form the contents of his last speeches, which close with one of the grandest poetical hymns. The law was then handed over to the priests that they might instruct the people in it henceforth; Joshua was installed as successor (while his own sons sunk into the obscurity of ordinary Levites), and he blessed the whole people. He then ascended the Mount of Nebo, from whence he cast a first and last look upon the land towards which he had plied all his life, and on which his feet were never to tread. He died upon this mountain, 120 years old, in the full vigor of manhood, according to the Scriptures, "and no man knew his

burial-place up to this day"—so that neither his remains nor his tomb were decorated by "Divine honors" being superstitiously paid to them.

This is a summary of M.'s life as derived from biblical as well as non-biblical sources. The latter—except, perhaps the very doubtful traditions of Manetho—be- long, whatever may be the date of the respective documents of the Pentateuch, to a much later age, and bear the air of tradition and legend, grown out of those very documents, so plainly on their face, that they are of about the same importance for historical purposes as the cycle of Midrashasagas that have gathered around M., and which are reproduced variously in Moslem Legendaries. On his office as a "prophet"—what was the special nature of his revelations, how far the doctrines promulgated by him were traditional among the Abrahamites, and how much of his laws is due to Egyptian influences; whether part of them was first inaugurated by later generations and ascribed to him, or whether others were never carried out at all: on these and similar questions which have been abundantly raised, more especially in recent times, we must refer for fuller information to the special works on the subject. Some notices of the more important points will be found under GENESIS, JAWS, PENTATEUCH, DECALOGUE, &c. There seems, however, but one conclusion. The brief span of human history of which we have any knowledge, shews few, if any, men of M.'s towering grandeur—even with all the deductions that the most daring criticism has yet proposed.

MOSHEIM, Johann Lorenz von, a distinguished church historian of Germany, was born at Lübeck on 9th October 1694, and studied at Kiel. In 1723, he became ordinary professor of theology at Helmstedt, from which he was removed in 1747 to a similar office in Göttingen. He died Chancellor of the University of Göttingen, 9th September 1755. His theological works are numerous, amongst which are a work on Bible morality, "Sittenlehre der Heiligen Schrift" (new ed., continued by J. P. Miller, 9 vols. Helmst. 1770—1778); and Discourses, "Heiligen Reden" (3 vols. Hamb. 1732, et seq.). But his most important contributions to theological literature are in the department of ecclesiastical history, in which his "Institutiones Historiæ Ecclesiasticæ" (Helmst. 1755) is familiar to every student as a work of great learning, fulness, and accuracy. It has been translated from the original very elegant Latin into English and other languages. The best English translation is that by Dr James Murdock (3 vols. New York, 1832), of which there are many reprints. Besides this, M. is the author of "Institutiones Historiæ Christianæ Majoræ" (Helmst. 1763); "De Rebus Christianorum ante Constantinum Commentarii" (Helmst. 1753); "Dissertationes ad Hist. Ecclesiasticam pertinentes" (2 vols. new ed. Altona, 1767); and "Versuch einer unparteiischen Ketzergeschichte" (2 vols. Helmst. 1746—1748). His stand-point is that of liberal orthodoxy; yet he is essentially *dogmatic*, and pays more regard to the mere "opinions" of men than to the character and genius shining through them; hence, his "Church History" is far inferior in point of richness, depth, and suggestiveness to that of Neander.

MOSEKWA, a river of European Russia, a branch of the Oka, which is itself a branch of the Volga. It is celebrated in history for the great battle, called the battle of Borodino (q. v.), fought on its banks, 7th September 1812, from which Ney (q. v.) obtained his title Prince of Moskwa. The M. rises in a marsh in the government of Smolensk, passes close by the towns of Moshalsk and Svenigrod, passes through the city of Moscow, and joins the Oka near Kolomna, in the government of Moscow. The whole length of its course is about 220 miles. A considerable commerce is carried on by boats on the M., and it is directly connected with the Volga by the M. Canal.

MOSOSAURUS (MUSE LIZARD), a genus of huge marine lizards, whose remains occur in rocks of cretaceous age. Three species are known, one from the upper chalk of Sussex, a second from the cretaceous beds of North America, and the third from the Maestricht beds. This last (*M. Hofmanii*) was first known from a nearly perfect head dug out of St Peter's Mount in 1790, and popularly called the great animal of Maestricht. Originally the property of Hofman, it was taken from him, in virtue of some clause in their charter, by the ecclesiastical authorities of Maestricht, who, in their turn, were compelled to give it up to the victorious French army, and by them it was removed to Paris. It is said that the French cannoniers, when preparing for the siege, had instructions not to point the artillery towards that

part of the town in which the precious specimen was deposited. This head is four feet in length, and the animal to which it belonged is estimated to have been 25 feet long. The total number of the vertebrae was 133; they were concave in front and convex behind, and were fitted to each other by a ball-and-socket joint, admitting of easy and universal flexion; the sacrum seems to have been wanting. The limbs were developed into four large paddles, and these with the comparatively short and strong tail, the bones of which were constructed to give great muscular power, enabled the animal to move quickly through the water in pursuit of its prey. The jaws were furnished with a single row of strong conical teeth. Cuvier first shewed the affinities of the animal. It is most nearly related to the modern monitor, but differs from all modern lizards in its peculiar adaptations for an ocean life, and in its great size. The largest living lacertian is only five feet in length, and of this a large proportion is made up by the tail; the *M.*, with its short tail, is estimated to have been at least 25 feet long.

**MOSQUE**, a Mohammedan house of prayer. The word is derived, through the Italian *moschea*, from the Arabic *masjid*, a place of prayer. The form of the oldest mosques (at Jerusalem and Cairo) is evidently derived from that of the Christian Basilica, the narthex being the origin of the court, with its arcade, and the eastern apses representing the principal buildings of the mosque facing Mecca. The original forms became, however, entirely obliterated in the progress of Mohammedan architecture, and the mosques, with their arcaded courts, gateways, domes, and minarets, became the most characteristic edifices of Saracenic art. Wherever the Mohammedan faith prevailed, from Spain to India, beautiful examples of these buildings exist. They vary considerably in style in different countries, the Saracens generally borrowing much from the architecture of the various nations who adopted their faith. In India, the mosques have many features in common with the temples of the Jains, while in Turkey they resemble the Byzantine architecture of Constantinople. Everywhere the dome is one of the leading and most beautiful features of the mosques, which commonly consist of porticoes surrounding an open square, in the centre of which is a tank or fountain for ablution. Arabesques and sentences of the Koran inscribed upon the walls, which are generally white-washed, and never bear any device representing a living thing, are the only ornaments of the interior. The floor is generally covered with mats or carpets; there are no seats. In the south-east is a kind of pulpit (*Mimbar*) for the Imam; and in the direction in which Mecca lies (the Kibleh), there is a niche (*Mehrab*) towards which the faithful are required to look when they pray. Opposite the pulpit, there is generally a platform (*Dikka*), surrounded by a parapet, with a desk bearing the Koran, from which portions are read to the congregation. The five daily prayers (see **MOHAMMEDANISM**), which are generally said at home—especially by the better classes—on week-days, are said in the mosque by the whole congregation on Fridays, the days of *Al-Ghumah*, or the Assembly, the Moslem Sundays, together with some additional prayers, and at times a sermon is superadded to the service. It is not customary for women to visit the mosques, and if they do, they are separated from the male worshippers. The utmost solemnity and decorum are preserved during the service, although in the hours of the afternoon (when there is no worship) people are seen lounging, chatting, even engaged in their trade, in the interior of the sacred building. On entering the mosque the Moslem takes off his shoes, carries them in his left hand, sole to sole, and putting his right foot first over the threshold, he then performs the necessary ablutions, and finishes by putting his shoes and any arms he may have with him upon the matting before him. The congregation generally arrange themselves in rows parallel to that side of the mosque in which is the niche, and facing that side. The chief officer of a mosque is the *Nazir*, under whom are two *Imams*, a kind of religious official, in no way to be compared with what we understand by a clergyman of a creed, but who performs a certain number of religious rites as long as the *Nazir* allows him to do so, and who, being very badly remunerated, generally has to find some other occupation besides. There are further many persons attached to a mosque in a lower capacity, as *Mueddins* (q. v.), *Bowwabs* (door-keepers), &c., all of whom are paid, not by contributions levied upon the people, but from the funds of the mosque itself. The revenues of mosques are derived from lands. With many of the larger mosques there are schools, academies

(Medressehs), and hospitals connected, and public kitchens, in which food is prepared for the poor.

**MOSQUITO** (Span. *gnat*), a name very generally given to the most troublesome species of *Culex*, and allied genera. See **GNAT**. The name *M.* is given, according to Humboldt, in some parts of tropical South America to species of *Simulia*, which are active during the day, whilst species of *Culex*, active chiefly during the night, are called *Zancudo*s; but these latter are the mosquitoes of other countries generally. The name was probably first used in the West Indies, where it particularly designates a species (*C. Mosquito*) very similar to the common *gnat*, but not quite so large, with black proboscis, and marked with silvery white on the head, thorax, and abdomen. It abounds in the warm parts of America, especially in marshy districts and in the vicinity of stagnant waters. It and similar species extend even to very northern regions, appearing during the heat of summer in prodigious swarms. Similar species are found also in similar situations in almost all parts of the world, and are almost as great a pest in Lapland as within the tropics. The bite which they inflict is painful, and their incessant sharp buzzing prevents sleep. In India and other countries, beds are provided with *mosquito curtains* of gauze, which are closely drawn, to protect the occupant, while the natives who cannot avail themselves of such protection, smear their bodies with oil. So numerous are mosquitoes in some localities in South America, that the wretched inhabitants sleep with their bodies covered over with sand three or four inches deep, the head only being left out, which they cover with a handkerchief; and travellers have been obliged to have recourse to the same expedient. Even thick clothes afford at best a very partial protection from mosquitoes, being readily penetrated by the proboscis. Mosquitoes are readily attracted to a lamp, and perish in its flame; but where they are numerous, a lamp only causes additional swarms to congregate to its neighborhood until it is extinguished, as is often very soon the case, by their dead bodies.

**MOSQUITO COAST**, Mosquito Territory, or Mosquitia, formerly a native kingdom, under the protectorate of Britain, lies on the east coast of Central America, having Honduras on the north, Nicaragua on the west, and Costa Rica on the south. The area is estimated at 15,000 English square miles, but as 20,000 miles of contested territory lie between it, and Honduras and Nicaragua, its extent would be more correctly given at 25,000 square miles. The coast is low, with many bays and lagoons, and possesses a number of good harbors. The two principal rivers are the Rio de Segovia (which rises within 35 miles of the Pacific Ocean), and the Rio Escondido, both of which flow into the Caribbean Sea. The climate is rainy, and the temperature, considering the latitude, is cool and equal, the thermometer seldom rising above 82° or falling below 71°. On the whole, this territory is one of the most healthy parts of Central America. Ague is not unusually common, epidemics are exceedingly rare, and white people who do not recklessly expose themselves enjoy the best health. The swampy grounds are generally covered with dense forests, in which dye-woods and timber-trees of great value abound. Rice, maize, manioc, and other tropical plants, are cultivated. The country abounds in deer of various kinds, half-wild horses and oxen roam in the savannahs, which are covered with tall grass, and alligators and serpents are common. The chief exports are mahogany, cocoa, ginger, sarsaparilla, and tortoise-shell, but the whole trade is inconsiderable. The inhabitants are of various races, the greater portion being aboriginal, but many are a cross between the native Indians and runaway negroes; they do not number more than from 10,000 to 15,000 in all. Their chief occupations are hunting and fishing, but a little agriculture and cattle breeding are also practiced.

The *M. C.* was discovered in 1502 by Columbus, and though never conquered, was claimed by Spain till about 1660, when the king, with consent of his people, placed himself under the protection of Britain. British colonists at different times attempted to found settlements in various parts of the country, but from various causes were soon after compelled to withdraw. Of late years they have met with more success. The foothold Britain thus obtained in Central America was viewed with great jealousy by the United States, who left no means untried to effect her expulsion. During the British protectorate a sort of constitutional government was established, consisting of a legislative body, and regular jury courts. In July 1850,

the United States and Great Britain bound themselves by the Clayton-Bulwer treaty "not to occupy, fortify, colonise, or exercise dominion over the M. C., or any part of Central America;" and in November 1859, Britain ceded the protectorate of M. C. along with the Bay Islands to Honduras, a proceeding which gave rise to much discontent among the natives of the coast, and a complete rebellion of the islanders. However, by a subsequent treaty, concluded 26th January 1860, the whole territory was finally handed over to Nicaragua.

**MOSESSES** (*Huac*), an order of acotyledonous plants, consisting of mere cellular tissue without vessels, and distinguished from *Hepaticæ* (q. v.), the order with which they are most nearly allied, by having always a leafy stem, and an operculated capsule or urn (*sporangium* or *theca*), which opens at the top, and is filled with spores arranged around a central column (*columella*). The capsule is covered by a hood (*calyptra*); and when it is ripe, and has thrown off the calyptra and operculum, exhibits around its mouth a single or double row of rigid processes, few or numerous, but always either four or a multiple of four, collectively called the *peristome*. These reproductive organs are viewed by many botanists as female flowers or *pistillidia*; whilst reproductive organs of another kind, sometimes found on the same plant, but more generally on distinct plants, are regarded as male flowers or *antheridia*. These are minute cylindrical sacs, occurring in the axils of the leaves, or collected into a head enclosed by variously modified leaves at the summit of the stem, and finally bursting and discharging a great number of spherical or oval vesicles, through the transparent walls of which, when moistened with water, filaments (*spermatozoids*) coiled up within them may be seen wheeling rapidly round and round. As the sacs merely discharge these vesicles and perish, it is supposed that the spermatozoids contained in them may effect the fertilisation of the spore-producing capsules; but this wants confirmation, and their particular office as reproductive organs is not yet fully ascertained.—None of the M. are large plants, many are very small. Many have elongated stems, often branching; others have the stems scarcely developed, so that they seem to consist of a mere tuft of leaves. They are generally social in their manner of growth. They are among the first plants which begin to clothe the surface of rocks, sands, trunks of trees, &c., adapting inorganic matter for the support of higher kinds of vegetation. They love moisture, and are generally more abundant in cold and temperate than in hot climates. They struggle for existence on the utmost limits of vegetation in the polar regions and on mountain-tops. They dry up and appear as dead in a very dry state of the atmosphere, but revive when moisture returns. Some of them grow in bogs, which they gradually fill up and consolidate. They are of great use in protecting the roots of many plants from cold and from drought, and afford harbor to multitudes of insects. Some of them supply food for cattle, particularly for the reindeer, when nothing better is to be obtained, and a wretched kind of bread is even made by some of the dwellers in the Arctic regions, of species of *Sphagnum*. Some are astringent and diuretic, but their medicinal virtues are unimportant. Among the other principal uses to which they are applied by man are the packing of things liable to be broken, the littering of cattle, the covering of garden plants in winter, and the stuffing of the open space in roofs to moderate the heat of attic rooms in summer and their cold in winter—perhaps the most important use to which they are ever put, at least in Britain, and to which, as the benefit is great and easily attained, it is wonderful that they are not much more frequently applied. The abundance of M. in meadows and pastures is disagreeable to farmers. The best remedies are proper drainage, the application of lime, and the liberal use of other manures, by which the soil may be enriched, so that better plants may grow with sufficient luxuriance, upon which the M. are choked and disappear.

Several thousand species of M. are known. Many of the M. are very beautiful, and their capsules and other organs are interesting objects of study, even with an ordinary magnifying-glass.

**MOSTA'R**, a town of European Turkey, capital of Herzegovina (q. v.), on the Narenta, 45 miles south-west of Bosna-Seraï. It is surrounded by embattled walls, contains ten mosques, a Greek church, and a famous Roman bridge of one arch, 26 feet in span. Silk, grapes, and wine are produced, and kulf-blades and weapons are manufactured. M. is also a place of considerable trade. Pop. 18,600.

**MÔ'SUL**, a town of Asiatic Turkey, in the province of Al-Jezireh (ancient Mesopotamia), is situated on the right bank of the Tigris, opposite the ruins of ancient Nineveh (q. v.), and 180 miles up the river from Bagdad. It is surrounded by walls, and is still in a more flourishing condition than most Turkish towns, on account of its caravan-trade with Diarbekir, Bagdad, and Aleppo, though its prosperity is nothing to what it formerly was. During the Middle Ages it supplied all Europe with its rich manufactures—*muslins*, according to Marco Polo, got their name from this town; now, on the contrary, the bazaars of M. are filled with the manufactures of the West. The principal causes of its diminished importance are the rise of Abushehr (q. v.) as an emporium of trade, and the opening up of the new sea-route to India by the Isthmus of Suez. M. is the seat of a Jacobite patriarch, and was formerly the great metropolis of all the Mesopotamian Christians (the Nestorians, the United Chaldeans, the Jacobites, &c.), but war, pestilence, famine, Mohammedan proselytism, oppression, and incessant anarchy, have greatly reduced their numbers. Pop. estimated at from 13,000 to 40,000, of whom about a fourth are Christians; 1500 Jews; the rest Mohammedans (Arabs, Kurds, and Turks).

**MOTAC'LLIDÆ.** See **WAGTAIL**.

**MOTAZILITES**, or *Mutazalites*, a "heretical" Mohammedan sect, dating a few generations after Mohammed, of which brief mention has been made under the heading **MOHAMMEDAN SECTS**. Their name is derived from an Arabic word, denoting "to separate one's self," and originally applied to any special sect or union of men; but the M. becoming the most important and dangerous in Islam, they received this denomination by way of eminence. They were also called *Moattalites*—i. e., those who divest God of His attributes—and *Kadarija*, i. e., "those who hold that man has a free will, and deny the strict doctrine of predestination." The first beginnings of this sect are traced to Mabud, who, in the time of Mohammed himself, already began to question predestination, by pointing out how kings carry on unjust wars, kill men, and steal their goods, and all the while pretend to be merely executing God's decrees. The real founder of the sect, as such, however, is Wasil b. Ata. He denied God's "qualities," such as knowledge, power, will, life, as lending to, if not directly implying, polytheism. As to predestination itself, this he only allowed to exist with regard to the outward good or evil that befalls man, such as illness or recovery, death or life, but man's actions he held to be entirely in his own hands. God, he said, had given commandments to mankind, and it was not to be supposed that He had, at the same time, preordained that some should disobey these commandments, and that, further, they should be punished for it. Man alone was the agent in his good or evil actions, in his belief or unbelief, obedience or disobedience, and he is rewarded according to his deeds. These doctrines were further developed by his disciple, Abu-l-Hudail, who did not deny so absolutely God's "qualities," but modified their meaning in the manner of the Greek philosophers, viz., that every quality was also God's essence. The attributes are thus not without but within Him, and so far from being a multiplicity, they merely designate the various ways of the manifestations of the Godhead. God's will he declared to be a peculiar kind of knowledge, through which God did what He foresaw to be salutary in the end. Man's freedom of action is only possible in this world. In the next, all will be according to necessary laws immutably preordained. The righteous will enjoy everlasting bliss; and for the wicked, everlasting punishment will be decreed. Another very dangerous doctrine of his system was the assumption that, before the Koran had been revealed, man had already come to the conclusion of right and wrong. By his inner intellect, he held, everybody must and does know—even without the aid of the divinely given commandments—whether the thing he is doing be right or wrong, just or unjust, true or false. He is further supposed to have held, that unless a man be killed by violent means, his life would neither be prolonged nor shortened by "supernatural" agencies. His belief in the traditions was also by no means an absolute one. There was no special security, he said, in a long, unbroken chain of witnesses, considering that one fallible man among them could corrupt the whole truth.

Many were the branches of these Motazilites. There were, apart from the disciples of Abu-l-Hudail, of whom we have just spoken, the Jobbaisans, who adopted



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Abu Ali Al-Wahhab's (Al-Jobbâi's) opinion, to the effect, that the knowledge ascribed to God was not an "attribute;" nor was his knowing "necessary;" nor did sin prove anything as to the belief or unbelief of him who committed it, who would anyhow be subjected to eternal punishment if he died in it, &c.—Besides these, there were the disciples of Abu Hashem—the Hashemites, who held that an infidel was not the creation of God, who could not produce evil.—Another branch of the M. were the disciples of Ahmed Ibu Hayet, who held that Christ was the eternal word *incarnate*, and assumed a real body; that there were two gods, or creators, one eternal, viz., the Most High God, and the other not eternal, viz., Christ—not unlike the Socinian and Arian theories on this subject; that there is a successive transmigration of the soul from one body into another, and that the last body will enjoy the reward or suffer the punishments due to each soul; and that God will be seen at the resurrection with the eyes of understanding, not of the body.

Four more divisions of this sect are mentioned, viz., the Jâhedhians, whose master's notion about the Koran was, that it was "a body that might grow into a man, and sometimes into a beast, or to have, as others put it, two faces—one human, the other that of an animal, according to the different interpretations." He further taught them, that the damned would become fire, and thus be attracted by hell; also, that the mere belief in God and the Prophet constituted a "faithful."—Of rather different tendencies was Al-Mozdar, the founder of the branch of the Mozdarians. He not only held the Koran to be uncreated and eternal, but so far from denying God the power of doing evil, he declared it to be possible for God to be a liar and unjust.—Another branch was formed by the Pasharians, who, while they carried man's free agency rather to excess, yet held that God might doom even an infant to eternal punishment—all the while granting that He would be unjust in so doing.—The last of these Motazilite sectarians we shall mention are the Thama-mians, who held, after their master, Thamâm, that sinners would undergo eternal damnation and punishment; that free actions have no producing author; and that, at the resurrection, all infidels, atheists, Jews, Christians, Magians, and heretics, should be returned to dust. We cannot, in this place, enlarge upon the different schools founded by the M., nor upon their subsequent fate. The vast scientific development, however, which their doctrines begot, and which resulted in the encyclopædic labors called "The Treatises of the Sincere Brethren and True Friends," are touched upon under *SINCERE BROTHERN* (q. v.).—See Weil, "Geschichte der Khalifen;" Sale's "Koran;" Steiner, "Mutaziliten;" Dieterici, "Transactions of the German Oriental Society," &c.

**MOTETT**, a name applied to two different forms of musical composition—1. A sacred cantata, consisting of several unconnected movements, as a solo, trio, chorus, fugue, &c.; 2. A choral composition, generally also of a sacred character, beginning with an introduction in the form of a song, perhaps with figurative accompaniment; after which follow several fugue subjects, with their expositions, the whole ending either with the exposition of the last subject, a repetition of the introduction, or a special final subject. A motett differs in this respect from a double or triple fugue, that the subjects never appear simultaneously, but are introduced one after the other. In one form of the motett, the successive phrases of an entire chorale are treated as so many fugal subjects.

**MOTH**, the popular name of all the insects included in the section *Nocturna* of the order *Lepidoptera* (q. v.). They formed the genus *Phalena* of Linnaeus, but are now distributed into many genera and families, the species being extremely numerous. Among them are the very largest *Lepidoptera*, and also the smallest. They are distinguished from Hawk-moths, and from most of the butterflies, by their bristle-shaped antennæ tapering from base to apex. The antennæ are frequently feathered or pectinated, especially in the males. The proboscis is generally similar to that of butterflies; but there are some groups of moths in which it is merely rudimentary, and these are supposed to take no food after they pass from the larva state. The thorax is generally shorter and more robust than in butterflies; the tibiae of the legs often bear a kind of spur; the wings are held either in a horizontal or in an inclined position when at rest; or, as in many of the smaller moths, are wrapped round the body. The two wings of the same side are generally hooked together in repose by means of bristles on the margin. The females of a few species are wingless.—*Moths*

are generally nocturnal, although to this rule there are a few exceptions. They often exhibit great richness and beauty of colors, although in brightness of color they are not generally equal to butterflies. Their food is similar to that of butterflies.—They lay great numbers of eggs, which exhibit varieties of form and color as great as those of the insects themselves. Their caterpillars are more widely various in form and characters than those of butterflies; differing from each other in the number of their legs, and in horns, protuberances, caudal appendages, hairy covering, &c. Some are social both in the larva and chrysalis state; forming, on their entering the latter state, very curious nests. The chrysalis of a moth is never angular nor furnished with protuberances, and is generally enveloped in a silken cocoon, pretty close and compact; although some moth chrysalids are found in a mere space filled with threads which cross each other in various directions. Silkworm (q. v.) moths are among the insects most useful to man; but moths in general are regarded by him as injurious, the larvæ of many feeding on leaves of various kinds, and often destroying valuable crops; and the larvæ of some small species proving very destructive to clothes, books, &c. The largest and most splendid moths inhabit tropical countries. Some of the most interesting and important kinds of moth are noticed in separate articles. Notwithstanding a popular dislike of moths, observation of their habits and of the richness of the color of many of them, is a favorite pursuit of naturalists.

**MOTHER CAREY'S CHICKEN**, a name familiarly given by sailors to the Storm Petrel and other small oceanic species of Petrel (q. v.).—The name **MOTHER CAREY'S GOOSE** is, in like manner, given to the Great Black Petrel or Gigantic Fulmar (*Procellariagigantea*) of the Pacific Ocean; a bird of about three feet in entire length, with very long wings, and blackish gray plumage, a ravenous feeder on dead whales and all other animal garbage, and which also kills and preys upon other sea-birds.

**MOTHER OF PEARL**, the shells of the large bivalve mollusc *Meleagrina margaritifera*, which also produces the precious pearls. See PEARL. These shells are collected in vast numbers in the tropical seas, chiefly on the coasts of Ceylon, Manilla, Cuba, Panama, and the South Sea Islands. Those from Panama are small and thick, and are known in commerce as "bullock" shells; those from Manilla are finest in quality, often as much as a foot in diameter, round, and flat. There are two varieties—the white or silver-lipped, and the black-lipped. So enormous is the trade in these shells, that the imports of this country alone amount to 3000 tons per annum, the value of which is nearly £100,000. Although large quantities of these shells are consumed in inlaying fancy wood-work, papier mâché, and in making knife-handles and other small ornamental objects, by far the greater portion is required for making buttons, chiefly in Birmingham.

**MOTHER WATER, MOTHER LYE.** See LYE.

**MOTHERWELL**, William, a Scottish poet and antiquary, was born in Glasgow, 13th October, 1797, and educated chiefly at the grammar-school of Paisley, where, in his fifteenth year, he entered the office of the sheriff-clerk. At the age of twenty-one, he was appointed sheriff-clerk depute of the county of Renfrew. In the following year he published his first work, the "Harp of Renfrewshire," containing biographical notices of the poets of that district, from the 16th to the 19th century. This work was but the prelude to one of far greater importance—his "Minstrelsy, Ancient and Modern," which appeared at Glasgow in 1827. In 1823, he commenced the "Paisley Magazine," in which some of his finest original pieces first saw the light, and in the same year accepted the editorship of the "Paisley Advertiser," a Conservative journal. In 1830, he became editor of the "Glasgow Courier." He died in that city, November 1, 1836, at the early age of 38. M. displays in his best moods (but only then) a rich, beautiful, and strong imagination, great warmth and tenderness of feeling, and a thorough knowledge of the language of a poet. His "Jeannie Morison" is unsurpassed for the mingled pathos and picturesque beauty of its reminiscences of boyish love; "The Sword-Chant of Thorstein Randi" is perhaps the most heroic rime in the English tongue; and the little piece beginning, "My hield is like to rend, Willie," has seldom been read without tears. An enlarged edition of his poetical remains, with a memoir, was published in London in 1849.

**MOTHERWELL**, a town of Scotland, in Lanarkshire, 11 miles from Glasgow.

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its progress, which in late years has been very rapid, is chiefly due to the coal mines in its neighborhood. Pop. (1861) 2925; (1871) 6943.

**MOTHERWORT** (*Leonurus Cardiacæ*), a plant of the natural order *Labiata*, found about hedges and in waste places in Europe, and now abundantly naturalised in some parts of North America. It is not very common in Britain, and probably has been introduced. It is perennial, has a branched stem about three feet high, stalked leaves, the lower ones 3-lobed, and crowded whorls of reddish-white flowers. The calyx has five pungent spreading teeth. The upper lip of the corolla is shaggy on the upper side, the lower lip trifid. The anthers are sprinkled with shining dots. The plant was formerly in much use as a domestic pectoral medicine, but is now comparatively little employed. It has a strong but not agreeable smell.—Other species of the same genus are found in Europe and the north of Asia.

**MOTION**, Laws of, are the fundamental principles connecting force and motion in the physical universe; and are obviously to be derived from *experiment* alone, since intuitive reasoning cannot possibly give us any information as to what may or may not be a law of nature. Though these laws are derived from experiment, it cannot be said that we have any very *direct* experimental proofs of their truth—our most satisfactory verifications of them are derived from the exact accordance of the results of calculation with those of observation in the case of such gigantic combinations of mutually influencing bodies as that of the solar system; and it is by such proofs that they must be considered to have been finally established.

They seem first to have been given systematically and completely by Newton, at the opening of the *Principia*; but the first two were known to Galileo, and some of the many forms of a part of the third were known to Hooke, Huyghens, Wren, and others. We shall give them here in order, with a few brief comments, showing their necessity and their use.

First, then, we naturally inquire, what matter would do if left to itself; and, by considering cases in which less and less external force is applied to a body, we are led to the statement called the *first law of motion*:

1. *Every body continues in its state of rest or of uniform motion in a straight line, except in so far as it may be compelled by impressed forces to change that state.*

This expresses simply the *inertia* of matter—i. e., a body cannot alter its *state* of rest or motion; for any such alteration external force is required. Hence the definition of Force (q. v.), as that which changes or tends to change a body's state of rest or motion.

Now, how does the change of state depend on the force which produces it? This is obviously a new question, to be resolved by experiment; and the answer is the *second law of motion*:

2. *Change of motion is proportional to the impressed force, and takes place in the direction of the straight line in which the force acts.*

Newton's silence is as expressive as his speech. Nothing is here said about the previous motion of the body, or about the number of forces which may be at work simultaneously. Hence, a force produces its full effect in the form of change of motion, whether it act singly or be associated with others; and whatever, moreover, be the original motion of the body to which it is applied. Hence, there is no such thing as *equilibrium of forces*; every force produces motion—and what we call equilibrium is *not* the balancing of forces, but the balancing of their *effects*. Hence, the absurdity of attempting to found the science of Statics on any other basis than is to be derived from the second law of motion; which, in fact, leads us at once (by the *Parallelogram of Velocities*, which is a purely geometrical conception) to the *Parallelogram of Forces*, and thence, with the help of the third law, to the whole subject of Statics. The second law also supplies the means of measuring *force* and *mass*; and of solving any problem whatever concerning the motion of one particle.

But more is required before we can study the motion of a *system* of particles—as a rigid body, or a liquid, for instance; or a system of connected bodies. Here there are mutual actions and reactions of the nature of pressure or of transference of energy (see **FORCE**) between the parts—and these are regulated by the *third law of motion*:

3. *To every action there is always an equal and contrary reaction: or, the mutual actions of any two bodies are always equal and oppositely directed in the same straight line.*

Thus, the mutual pressure between two bodies has equal, but *opposite*, values for the two. The tension of a rope is the same throughout, and tends as much to pull *back* the horse at one end as to pull *forward* the canal-boat at the other. The earth exerts as much attractive force on the sun as the sun exerts on the earth—and the same law applies to the other attractive and repulsive forces, as those of electricity and magnetism.

But Newton goes much further than this; he shews, in fact, that action and reaction (subject to the third law) may consist in *work done by a force*, instead of the mere force or pressure itself. From this form of the third law we derive at once the principle of Virtual Velocities (q. v.), which in its application to machines is familiar as "*What is gained in power is lost in speed.*" But we also derive the grand principle of the indestructibility of work or energy; at all events in the case of the ordinary mechanical forces—and this must be regarded as one of the grandest discoveries which science owes to Newton. It is true that he merely *mentions* it, and then abruptly passes to another subject; yet we can hardly exaggerate the value of this single remark. Experimenters, mainly Davy and Joule, have since shewn that all the physical energies, as heat, light, electricity, &c., are subject in their transformations to the third law of motion, and thus the system constructed by Newton for ordinary dynamical purposes, is now found to rule the most mysterious of the affections of matter. For a development of this, see our article on **FORCE**.

**MOTION, Animal.** Motion or progression is that function by which an animal is able to transport itself from place to place. It is enjoyed exclusively by animals, there being nothing strictly analogous to it in the vegetable kingdom. The organs employed in locomotion are of two kinds, the *passive* and the *active*; the former including all those textures which form the skeleton, and by which its segments are united, as fibrous and areolar tissue, synovial membrane, cartilage, fibro-cartilage, and bone, while the latter includes the muscles with the nerves, which convey to them the mandates of the will.

Before proceeding to notice the different modes of progression of men and animals, it may be expedient to say a few words on *standing*, or the natural attitude of an animal. This attitude depends upon the form and functions of the limbs. Most of the terrestrial mammals and the reptiles (excepting the serpents), both of which use four feet in walking, have the backbone (the vertebral column) nearly horizontal (being only slightly concave downwards), and resting, at the same time, both on the fore and hind legs. Birds, whose anterior extremities are intended for flight, stand upon the posterior limbs only, although in their case, too, the backbone is generally nearly horizontal when the animal is at rest. Man alone stands erect with his head supported on the summit of the nearly vertical vertebral column. Some other animals (monkeys, hares, kangaroos, &c.) can rise more or less erect, but in their case the attitude is obviously not the natural one.

In standing, it is requisite that the limbs should be so arranged that the centre of gravity may fall within the space included by the feet. If the centre of gravity does not fall within this space, the animal cannot stand, but must fall to that side to which the centre of gravity inclines. On this account certain aquatic birds (the albatross, for example), which have their feet placed very far back, cannot use them for walking. If an animal has four legs, it is not necessary that they should have the broad base, which is essential in bipeds. We see that most quadrupeds have comparatively small feet, while birds are furnished with long toes, which, when spread out, form large bases of support. Moreover, the flexor muscles of the toes are so arranged that the weight of the body causes them to contract firmly, and hence birds are enabled to sleep standing without any effort.

**Walking** is the most common form of progression. When it is accomplished by two legs only, as in man, the body is inclined forwards, carrying the centre of gravity in that direction; and while one leg supports the body, the other is thrown forward to prevent it from falling, and to sustain it in turn. Hence, walking has been defined to be a continual falling forwards, interrupted by the projection of the leg. Those writers who have especially studied the theory of walking (Borelli, the brothers Weber, and Bishop) have divided the time of a step into two portions—i. e., that in which one leg only rests on the ground, and that in which both legs rest on the ground. The period in which both feet are on the ground is shorter than that in which the body is supported by one leg only. During the time the body is supported by one leg, the other leg swings from behind forwards, without the active interven-

tion of its muscles, but by the mere force of gravity—in short, like the pendulum of a clock. When this leg is again placed on the ground, the first interval ends, and the other—i. e., that in which the body is supported by both legs—begins, and of course terminates with the raising of the other leg. The time that the body is supported by both legs diminishes as the velocity increases, and vanishes as the walk merges into a run; while, on the other hand, it attains its maximum in extremely slow walking, when it is found by experiment to amount to half the time in which only one leg supports the body. The greatest velocity of walking is attained when the time of a step is equal to half the duration of the motion of the swinging leg, and the velocity in walking of any given person depends on the time taken in making each step, and on the length of the steps; and both of these are, again, dependent on the height at which the centre of gravity of the body or the heads of the thigh-bones are carried above the ground; for as the height of the latter diminishes, the length of the step is increased, while its time is diminished, and *vice versa*. The best walkers are incapable of acquiring a speed of more than seven miles an hour; and even this speed cannot be kept up for any length of time. The walking of quadrupeds is a similar process to that of bipeds, except that the body always rests on at least two legs. The limbs are raised in a determinate order, and usually in such a manner that the hind-leg of one side succeeds the fore-leg of the opposite side.

*Running* consists of the same succession of motions as walking; but these motions are so accelerated, that there is a period between two steps when the body is not supported on either leg; and this constitutes the essential difference between the two paces. It requires a far greater expenditure of muscular force than walking, and cannot be long maintained without considerable exhaustion. First-rate runners can accomplish a mile in a few seconds under four minutes and a half, and ten miles in an hour. (Levett in a match with Frost, which came off on the 23d of March 1852, at Copenhagen Fields, ran 10 miles 250 yards, in 59' 53", and Deerfoot ran 11 miles 740 yards, at Brompton, in an hour). In quadrupeds there are various paces besides walking, which are known as trotting, cantering, and galloping; and as every one is familiar with the ordinary paces of the horse, we shall take that animal as our illustration. In *trotting*, the horse moves its legs in pairs diagonally. Thus, if the left fore and right hind leg be raised, and advanced first, the right fore and left hind leg will be raised the instant the others reach the ground. In fact, in trotting, the first pair are actually raised before the other legs reach the ground, so that there is a minute interval when all four legs are raised above the ground at the same time. The velocity acquired by moving the legs in pairs (as in running), instead of consecutively (as in walking), depends upon the circumstance, that in trotting each leg rests on the ground during a short time and swings during a long time, while in walking the swing occupies a short period, and the rest a comparatively long one. In *cantering*, the animal, after advancing the two fore-legs one after the other, brings forward the two hind-legs simultaneously; and when this movement is greatly urged, the fore-legs are raised together, as well as the hind-legs, and the pace then becomes the *gallop*.

In *leaping*, the horse raises the fore-legs from the ground, and propels the body upwards and forwards by the hind-legs alone. This act in the horse is, however, mainly the result of education, and those animals that leap or spring upon their prey (as the members of the cat tribe) crouch before leaping, in order to throw the body forward with the greatest possible force, by first bending all the limbs, and then suddenly extending them. As the hind-legs are, however, the essential agents in leaping, we observe that in those animals whose natural mode of progression is leaping—as frogs, hares, kangaroos, &c.—the hind-legs are much longer, and more muscular than the fore-legs. Leaping is a common mode of progression in many short-legged birds (blackbirds, thrushes, flukes, sparrows, &c.), in which the step would be extremely short if performed by moving the legs alternately. There is also a large number of insects, such as grasshoppers, fleas, &c., whose ordinary mode of progression is by leaps; and it is in this class of animals that the leaping power is developed to its greatest extent. The common flea, for example, can leap 200 times its own length. While fleas, locusts, and grasshoppers leap by means of their long and strong hind-legs; other insects, as the *Poduridæ*, or spring-tails, possess a forked tail, which they bend beneath the body, and which, when suddenly extended, propels them to a considerable distance.

*Climbing* is merely walking on an inclined or vertical surface. It is usually accomplished by means of sharp nails or claws, as in the cat-tribe, the lizards, &c. In many birds, as the woodpeckers, parrots, &c., the toes are arranged in two divisions, so as to grasp branches in the manner of a hand. Bears and sloths use their arms for climbing, while monkeys use their hands, and in some cases their tails. It is only in a very few cases, as in the sloth, that this is the ordinary method of progression.

The act of *flying* in the bird is accomplished by the simultaneous action of the two anterior limbs, the wings, much as leaping is by that of the two posterior limbs. See **FLYING; BIRDS**. Many attempts have been made to estimate the velocity at which different birds can fly. Whether, as has been stated, the eider-duck can fly 90, and the hawk 150 miles in an hour, is very questionable; but it has been ascertained that carrier-pigeons can accomplish from 38 to 42 miles in that time.

The bats are the only mammals which possess a true power of flight. For a description of their organs and mode of flight, we must refer to the article **BAT**, where will also be found a notice of the false claims of some other mammals, as the so-called flying-squirrel, to the possession of true flight. Similarly, the actions of the flying lizard and of the flying-fish are not true flight. In no class of animals is the mechanism of flight so perfect as in insects. The dragon-fly, for example, can outstrip the swallow; and can do more in the air than any bird, as it can fly backwards and sidelong, to right or left, as well as forwards without turning. The wings of insects, of which there may be either one or two pair, are analogous (as instruments of motion) to the feathered wings of birds, but are regarded as homologous to (or in their essential nature) branchiæ or respiratory organs. For details regarding the mechanism employed in their aerial progression by insects, see **INSECTS**.

*Swimming* is the mode of progression employed by most aquatic animals. It mainly differs from flying in this respect, that water being much more dense than air, and the body of the animal being nearly of the same weight as the water it displaces, very little effort is required to keep the animal from sinking, and hence almost the whole of the muscular force can be employed in progression. In fishes, the locomotive organs consist of the fins and tail, the latter being the great propelling organ. The swimming of a fish has been correctly compared to the motion of a boat propelled by a single oar or scull at the stern. In the same manner as a succession of strokes alternately right and left propels the boat straight forwards, so the fish advances by striking alternately right and left with its tail. The caudal fin, in which the tail ends, is vertical in fishes, and is usually considerably forked, when there is great speed. The ventral fins are for the purpose of keeping the fish in its proper position, with the back upwards, as is shown by a well-known experiment of Borelli, who, after cutting off these fins, restored the living fish to the water, when it rolled from side to side like a drunken man. The air-bladder with which many fishes are provided, and which they can distend and contract at pleasure, facilitates their swimming by enabling them to modify their specific gravity. Most terrestrial mammals, excepting man, swim at once the first time they find themselves in deep water. The reason of this is, that their limbs move in water precisely as they do on land, and no new action either as regards direction or order is required, as is the case with man, to enable them to swim. Those which frequent the water, as seals, otters, and beavers, have webbed feet like ducks and other palmed birds, the toes being united by membranes, which, when expanded, act as paddles. A large number of invertebrate animals move chiefly by swimming. Thus lobsters move by means of a vertical motion of the tail, and many of the crabs by means of their posterior legs, which are fashioned like oars. Many insects swim with their legs, which are fringed with hairs to give additional surface. The cuttle-fish uses its long arms as oars, and darts through the water with extreme rapidity; while other molluscs erect sail-like organs, by which they are propelled along the surface of the water. **SWIMMING**, as a gymnastic exercise, is described in a separate article.

Notices of the more special modes of progression will be found under a variety of heads. See **CRUSTACEA**, **SERPENTS**, **WORMS**.

**MOTION**, in Plants. See **IRRITABILITY** and **SPORE**.

**MOTIVE**, or *Motivo*, in a musical composition, means the principal subject on

which the movement is constructed, and which, during the movement, is constantly appearing in one or other of the parts, either complete or modified. In elaborate and long compositions there are also secondary motives.

**MOTLEY**, John Lothrop, LL.D., D.C.L., &c., American historian, was born at Dorchester, Massachusetts, April 15, 1814. After graduating at Harvard University, he spent a year at Göttingen, another at Berlin, and travelled in Italy and other parts of Southern Europe. Returning to America, he studied law and was admitted to the bar in 1837; but preferring literature, he wrote a historical romance, entitled "Morton's Hope" (1839), which had little success. In 1840, he received the appointment of secretary of legation to the American Embassy to Russia, but soon resigned, and in 1849, published another unsuccessful novel, entitled "Merry Mount, a Romance of the Massachusetts Colony." He attracted attention, however, by some valuable historical essays for American reviews, among which may be mentioned one on De Tocqueville's "Democracy in America," and another on "Peter the Great;" and having planned a history of Holland, he proceeded to Europe for materials, and after five years' labor, published in 1856 "The Rise of the Dutch Republic." In 1860 appeared a continuation of it: "The History of the United Netherlands from the Death of William the Silent to the Synod of Dort." M. was appointed in 1861 United States minister at the court of Vienna, a post from which he was recalled in 1867. In 1869 he was sent as minister to the court of St James, but was recalled the following year. In 1874, he published "The Life and Death of John of Barneveldt, Advocate of Holland; with a View of the Primary Causes and Movements of the Thirty Years' War" (2 vols.). He died 29th May 1877.

**MOTRI'L**, a town of Spain, in the province of Granada, and 35 miles south of the city of that name, in a productive district 3 miles from the sea. Agriculture and fishing are the principal employments of the inhabitants. Pop. 14,000.

**MOTTO**, in Heraldry, a word or short sentence which forms an accompaniment to a coat-of-arms, crest, or household badge. Mottoes were originally attached to the badge when the family had one, or to the crest where there was no badge. In later heraldry, the practice is to place the motto in an escrol either over the crest or below the shield. A motto is sometimes a religious or moral sentiment, as "Gardez la foi," "Humanitate;" it is not unfrequently a heroic exclamation or war-cry, "Courage sans peur," "Forward." In a great many cases it bears reference to the crest, badge, or some bearing of the escutcheon; thus, Stuart, Earl of Moray, has for crest a pelican wounding herself, and for motto, "Salus per Christum Redemptorem;" and not a few mottoes are punning allusions to the family name—as Scudamore, "Scuto amoris Divini;" Vernon, "Ver non semper viret;" "Fare, fac," for Fairfax; and "Time Deum, cole regem," for Coleridge. Two mottoes are sometimes used by the same family—one above the crest, the other below the shield. The motto, "Dieu et mon Droit," which accompanies the royal arms of Great Britain, is supposed to have been a war-cry, and was used in England at least as early as the time of Henry VI. Its origin has been assigned to a saying of Richard I., "Not we, but God and our right have vanquished France."

**MOUFFLON**, or *Musimon* (*Ovis* or *Caprovus Musimon*), the wild-sheep of Corsica, Sardinia, Cyprus, Greece, &c. It is about the size of a small fallow-deer, covered with hair and not with wool, except that hair of a somewhat woolly character appears in winter. The upper parts are brownish, the under parts whitish; the hair of the neck is long; the tail is very short. The horns of the male are very large, approaching to those of the Argali. The M. lives chiefly in the higher parts of mountainous regions, and is not easily approached by the hunter.

**MOULD**, or *Mouldiness*, the common name of many minute fungi which make their appearance, often in crowded multitudes, on animal and vegetable substances, either in a decaying or in a living but morbid state. To the naked eye, they often seem like patches or masses of fine cobweb, and are discovered by the microscope to consist of threads more or less distinctly jointed, sometimes branched. Some species of M. occur on many different substances; others seem to be peculiar to substances of particular kinds, as decaying pears, decaying gourds, &c. Some of the moulds belong to the suborder of fungi called *Phycomyces*. See *FUNGUS*. One of these is the *Common M.* (*Mucor mucedo*), so plentifully found on fruit, paste, pre-

erves, &c., in a state of incipient decay, the progress of which it hastens. It consists of cobweb-like masses of threads, from which rise many short stems, each bearing at the top a roundish membranous blackish spore-case.—A nearly allied, and also very common species, is *Ascothoria mucedo*, which forms a bluish *M.* on bread. From a spreading cobweb-like bed rise long slender branches, terminated by spore-cases, of which the vesicle collapses into the form of a little *picus*.—An interesting species of *M.*, remarkable for its luxuriance and beauty of colors—at first white, then yellow, with orange spore-cases, then shining green or olive, and with threads often several inches long—grows on fatty substances.—Other species of *M.* are ranked among *Hyphomycetes*, a suborder of Fungi, having a floccose thallus and naked spores. One of these is the BLUE *M.* (*Aspergillus glaucus*), which imparts to cheese a flavor so agreeable to epicures, and perhaps marks it as in a condition most suitable for promoting the digestion of other aliments, of which epicures eat too much. Advantage is often taken of the fact, that a small portion of cheese affected with *M.* will speedily infect sound cheese into which it may be introduced. It is one of the few cases in which the propagation of these fungi is ever desired and sought after by man.—SNOW *M.* (*Lanosa nivatis*) is found on grasses, and especially on barley and rye beneath snow, often destroying whole crops. It appears in white patches of a foot or more in diameter, which finally become red as if dusted with red powder.

Even living animals are liable to be injured by fungi of this kind. Silk-worms are killed in great numbers by one called MUSCARDINE (q. v.), or SILK-WORM ROT. Such fungi are sometimes developed on the mucous membrane and in internal cavities of vertebrated animals; and on the bodies of invertebrated animals, as the common house-fly, which, in the end of autumn, when it becomes languid, often dies from this cause. Even strongly-scented substances, if moist, are liable to be attacked by *M.* of one kind or other; nor are strong poisons, either animal or vegetable, a sufficient safeguard. *Ascothoria mucedo* springs up readily in paste full of corrosive sublimate; and the mycelium of moulds is found in strong arsenical solutions. The only sure preventive of *M.* is dryness. Many of the moulds vegetate in liquids, but do not attain their perfect development, only appearing as filamentous and flocculent mycelia. The Vinegar Plant (q. v.) is an instance of this kind.

Mildews and Moulds are very nearly allied.

The rapidity with which these fungi are produced is marvellous. "In favorable circumstances, a plant will pass through every stage of growth to perfect maturation of its seeds in less than two days, the threads which sustain the ripe sporangia being so long, and yet so delicate, as to make it a marvel that they can remain erect."—(Berkeley).

MOULD, the model or pattern from which workmen execute mouldings, ornaments, &c. Also the shape or bed in which metal and other castings are made.

MOULDINGS, the curved and plane surfaces used as ornaments in cornices, panels, arches, &c., and in all enriched apertures in buildings. In classic architecture the mouldings are few in number, and definitely fixed in their forms. There are eight kinds of these regular mouldings, viz., the Cyma, the Ovolo (or Echinus), the Talon, the Cavetto, the Torsus, the Astragal, the Scotia, and the Fillet (q. v.); and each of these mouldings has its proper place assigned to it in each order. See COLUMN. In Gothic architecture, and all other styles, the mouldings are not reduced to a system as in the Greek and Roman styles, but may be used in every variety of form at the pleasure of the artist. Certain forms generally prevail at one period in any style. Thus, in Gothic architecture, the date of a building may in many instances be determined by the form of the mouldings. The Norman mouldings were very simple in outline, and frequently enriched with the zigzag and billet ornaments.

In the early English style, the mouldings are also simple in outline, and are usually arranged in rectangular divisions, and consist of alternate rounds and hollows. In late examples of this style, the fillet was introduced, and led to the more elaborate form of mouldings during the Decorated period.

The mouldings of the perpendicular style are generally flatter and thinner than the preceding, and have large hollows separated by narrow fillets, which produce a meagre effect.



Each of these styles has its peculiar ornaments and style of foliage; and when these are used along with the mouldings, there is no difficulty in determining the approximate date of a building.

**MOULINS**, a town of France, capital of the department of Allier, on the right bank of the river Allier, here crossed by a handsome stone bridge of 13 arches, lies 213 miles, by railway, south-east of Paris, and 95 miles north-west of Lyon. M. was formerly the capital of Bourbonnais. It is a clean, well-built town, with pretty promenades. The principal buildings are the cathedral of Notre Dame (for the enlargement of which the sum of one and a half million francs was granted in 1852), the museum, the theatre, the public library containing 20,000 vols., the new town-house, the Palace of Justice, and the college. Of the old castle, built by the Duc de Bourbon in 1530, only a square tower remains, which is used as a prison. M. carries on trade in coal, wood, iron, grain, wine, oil, and cattle. Pop. (1872) 17,836.

**MOULMEIN**, a town in the province of Tenasserim, British Burmah, situated on the Gulf of Martaban, in the east of the Bay of Bengal, at the junction of the rivers Salween, Gyne, and Attaran, in 16° 29' n. lat., and 97° 38' e. long. M., one of the healthiest stations in India, is a pretty specimen of an eastern town. It is divided into five districts, each of which is under a young or native head of police. The streets are, for the most part, shaded with trees, principally of the acacia tribe, and the glossy jack is often seen half covering a native house, its great fruit, as large as a child's head, ripening in the sun. The principal street, about 3 miles in length, runs due north and south, and parallel with the river Salween. The native houses are constructed in the usual Burman style of bamboo, and a thatch made of the leaf of the water-palm. All are raised on piles, according to the universal custom of the country. Men walk about with the green paper chattrah, or Chinese umbrella, used throughout the provinces; the *gharie*, or India cab, dashes along, the attendant imp revelling in heat and dust.

M. is backed by a fine range of hills, on whose heights flash the gilded spires of innumerable pagodas; and here, too, are built many pretty residences, commanding a fine view of the town, river, and adjacent country, which for picturesque beauty and varied scenery has few equals. M. boasts various churches, chapels, and missionary establishments, several charitable and educational institutions, substantial barracks, a general hospital, public library, &c. Vessels drawing 10 feet of water can come up to M., under charge of pilots from Amherst, and at spring-tide ships of any tonnage may reach the town. The rise and fall of the water is at that time from 20 to 23 feet. The population of M. is steadily, if slowly, on the increase. In 1856, it was 43,633; in 1872, it had reached 46,242. Of these, divided according to their religion, about 27,000 were Buddhists, 11,000 Hindus, 6000 Mussulmans, and 2000 Christians. The mean temperature of M. for the year 1872 was 78°—the highest being 96° in April, and the lowest 61° in January. As to nationality, besides the Burmans proper, the inhabitants of M. include Eurasians or half-castes, Talens, Chinese, Shans, Karens, Armenians, Jews, Malays, and natives of Hindustan.

M. possesses great facilities for ship-building, and many fine vessels have lately been constructed in the building-yards of Tavoyzoo and Mopoon. The principal exports from M. are teak-timber and rice; the imports consist of general merchandise, chiefly piece-goods, hardware, provisions, and sundries.

See "The Tenasserim and Martaban Directory;" Winter's "Six Months in British Burmah" (Lond. 1858); Marshall's "Four Years in Burmah" (Lond. 1860); "Blue-Books."

**MOULTING** is the term applied by naturalists to the periodical exuviation, or throwing off of certain structures, which are for the most part of an epithelial or epidermic character. Thus, in a considerable number of the *Articulata*, the external covering is thrown off, and replaced many times during life. In some of the minute Entomostracous Crustacea of our pools, a process of moulting, similar to that which occurs in crabs and lobsters, occurs every two or three days, even when the animals seem to have attained their full growth. In the crabs, in which the process has been carefully observed, the *exuvium*, or cast-off shell, consists not only of the entire external covering, including even the faceted membrane which forms the anterior coat of the compound eyes, but also carries with it the lining membrane of

the stomach, and the plates to which the muscles are attached. During growth, this moulting takes place as often as the body becomes too large for the shell; and after the animal has attained its full size, it is found to occur at least once a year, at the reproductive season. During the early growth of insects, spiders, centipedes, &c., a similar moult is frequently repeated at short intervals, but after they have attained their full size, no further moulting takes place. In the *Vertebrata* we have examples of as complete a moulting, and replacement of new skin, among frogs and serpents as occur in the *Articulata*, the whole epidermis being thrown off at least once, and, in some instances, several times yearly. In birds, the feathers are periodically cast off and renewed; in mammals generally, the hair is regularly shed at certain periods of the year; and in the deer tribe the casting off and renewal of the antlers must be regarded as a special example of moulting. In man, the continual exuviation of the outer layers of the epidermis is a process analogous to that which takes place on a more general scale in the lower animals.

**MOULTRIE**, Fort, a fortress on Sullivan's Island, at the mouth of Charleston Harbor, South Carolina, celebrated for the repulse of a British squadron commanded by Sir Peter Parker, January 23, 1776. The fort, at that time, was hastily built of Palmetto logs and sand, with 31 guns and 485 men. The spongy wood of the palmetto was found to resist the cannon balls perfectly. The fort was afterwards rebuilt, and in April 1861, took part in the reduction of Fort Sumter, and the commencement of active hostilities in the civil war of secession.

**MOUND** (Lat. *mundus*), in Heraldry, a representation of a globe, surmounted with a cross (generally) pattée. As a device, it is said to have been used by the Emperor Justinian, and to have been intended to represent the ascendancy of Christianity over the world. The royal crown of England is surmounted by a mound, which first appears on the seal of William the Conqueror, though the globe without the cross was used earlier.

**MOUNT**, in Heraldry. When the lower part of the shield is occupied with a representation of ground slightly raised, and covered with grass, this is called a mount in base; e. g., Argent, on a mount in base, a grove of trees ppr.—Walkinshaw of that ilk, Scotland.

**MOUNT VERNON**, the seat and tomb of George Washington, first President of the United States of America, on the right bank of the river Potomac, in Virginia, 15 miles below Washington. The residence of Washington, finely situated on the rising bank of the river, and his tomb, with an estate of 200 acres, have been purchased by a patriotic society of ladies, to be kept as a place of public resort, and a memorial of the "Father of his country."

**MOUNTAIN ASH**. See **ROWAN**.

**MOUNTAIN LIMESTONE**, the basement rock of the carboniferous series in the south of England and in Wales. It consists of a calcareous rock loaded with marine remains, the greater part of the rock being made up bodily of corals, crinoids, and shells. It has a variable thickness, sometimes reaching as much as 900 feet. In the north of England and in Scotland, the marine limestones are not separated from, but alternate with the coal-bearing strata. See **CARBONIFEROUS SYSTEM**.

**MOUNTAINS**. The number and altitude of the mountains of the globe are so great that they form almost everywhere prominent objects, and operate to a large extent in modifying the climatic conditions of every country in the world. Yet the amount of solid material so raised above the ordinary level of the land is not so much as might be expected. Remembering that elevated plateaus of great extent occur in several regions, and that the general surface of the earth is considerably higher than the sea-level, it has been estimated that were the whole dry land reduced to a uniform level, it would form a plain having an elevation of 1800 feet above the sea. And were these solid materials scattered over the whole surface of the globe, so as to fill up the bed of the ocean, the resulting level would be considerably below the present surface of the sea, inasmuch as the mean height of the dry land most probably does not exceed one-fiftieth of the mean depth of the bed of the ocean.

Mountains, and especially mountain-chains, subserve important uses in the econ-

omy of nature, especially in connection with the water system of the world. They are at once the great collectors and distributors of water. In the passage of moisture-charged winds across them, the moisture is precipitated as rain or snow. When mountain-ranges intersect the course of constant winds by thus abstracting the moisture, they produce a moist country on the windward-side, and a comparatively dry and arid one on the leeward. This is exemplified in the Andes, the precipitous western surface of which has a different aspect from the sloping eastern plains; and so also the greater supply of moisture on the southern sides of the Himalayas brings the snow-line 5000 feet lower than on the northern side. Above a certain height the moisture falls as snow, and a range of snow-clad summits would form a more effectual separation between the plains on either side than would the widest ocean, were it not that transverse valleys are of frequent occurrence, which open up a pass, or way of transit, at a level below the snow-line. But even these would not prevent the range being an impassable barrier, if the temperate regions contained as lofty mountains as the tropics. Mountain-ranges, however, decrease in height from the equator to the poles in relation to the snow-line.

The numerous attempts that have been made to generalise on the distribution of mountains on the globe have hitherto been almost unsuccessful. In America, the mountains take a general direction more or less parallel to the meridian, and for a distance of 8280 miles, from Patagonia to the Arctic Ocean, form a vast and precipitous range of lofty mountains, which follow the coast-line in South America, and spread somewhat out in North America, presenting everywhere throughout their course a tendency to separate into two or more parallel ridges, and giving to the whole continent the character of a precipitous and lofty western border, gradually lowering into an immense expanse of eastern lowland. In the Old World, on the other hand, there is no single well-defined continuous chain connected with the coast-line. The principal ranges are grouped together in a Y-shaped form, the general direction of which is at right angles to the New World chain. The centre of the system in the Himalayas is the highest land in the hemisphere. From this, one arm radiates in a northeast direction, and terminates in the high land at Behring Straits; the other two take a westerly course; the one a little to the north, through the Caucasus, Carpathians, and Alps, to the Pyrenees; the other more to the south, through the immense chain of Central African mountains, and terminating at Sierra Leone. Most of the principal secondary ranges have generally a direction more or less at right angles to this great mountain tract.

The inquiry into the origin of mountains is one that has received not a little attention. Geologists have shewn that the principal agents in altering the surface of the globe are denudation, which is always abrading and carrying to a lower level the exposed surfaces, and an internal force which is raising or depressing the existing strata, or bringing unstratified rocks to the surface. Whether the changes are the small and almost imperceptible alterations now taking place, or those recorded in the mighty mountains and deep valleys everywhere existing, denudation and internal force are the great producing causes. These give us two great classes of mountains.

1. *Mountains produced by denudation.*—The extent to which denudation has altered the surface of the globe can scarcely be imagined. All the stratified rocks are produced by its action; but these do not measure its full amount, for many of these beds have been deposited and denuded, not once or twice, but repeatedly, before they reached their present state. Masses of rock more indurated, or better defended from the wasting currents than those around, serve as indices of the extent of denudation. The most remarkable case of this kind, with which we are acquainted, is that of the three insulated mountains in Ross-shire—Sail Vein, Coal Beg, and Conl More—which are about 8000 feet high. The strata of the mountains are horizontal, like the courses of masonry in a pyramid, and their deep red color is in striking contrast with the cold bluish hue of the gneiss which forms the plain, and on whose upturned edges the mountain-beds rest. It seems very probable, as Hugh Miller suggests, that when the formation of which these are relics (at one time considered as old Red Sandstone, but now determined by Sir Roderick Murchison as being older than Silurian), was first raised above the waves, it covered, with an amazing thickness, the whole surface of the Highlands of Scotland, from Ben Lomond to the Maiden Paps of Calthness, but that subsequent denudation swept it all

away, except in circumscribed districts, and in detached localities like these pyramidal hills.

2. *Mountains produced by internal force.*—These are of several kinds. (a.) Mountains of ejection, in which the internal force is confined to a point, so to speak, having the means of exhausting itself through an opening in the surface. The lava, scoriae, and stones ejected at this opening form a conical projection which, at least on the surface, is composed of strata sloping away from the crater. Volcanoes are mostly isolated conical hills, yet they chiefly occur in a somewhat tortuous linear series, on the mainland and islands which enclose the great Pacific Ocean. Vesuvius and the other European volcanoes are unconnected with this immense volcanic tract. (b.) But the internal force may be diffused under a large tract or zone, which, if it obtain no relief from an opening, will be elevated in the mass. When the upheaval occurs to any extent, the strata are subjected to great tension. If they can bear it, a soft rounded mountain-chain is the result; but generally one or more series of cracks are formed, and into them igneous rocks are pushed, which, rising up into mountain-chains, elevate the stratified rocks on their flanks, and perhaps as parallel ridges. Thus, the Andes consist of the stratified rocks of various ages, lying in order on the granite and porphyry of which the mass of the range is composed. The position of the strata on such mountains supplies the means of determining, within definite limits, the period of upheaval. The newest strata that have been elevated on the sides of the mountain when it was formed, give a date antecedent to that at which the elevation took place, while the horizontal strata at the base of the mountain supply one subsequent to that event. Thus, the principal chain of the Alps was raised during the period between the deposition of the Tertiary and that of the older recent deposits. (c.) But there is yet another way in which the upheaving internal force operates, viz., where it does not act at right angles to the surface, but rather obliquely, and, as it were, pushes the solid strata forwards, causing them to rise in huge folds, which, becoming permanent, form parallel ranges of mountains. The crust of the earth, in its present solid and brittle condition, is thus curved, in a greater or less degree, by the shock of every earthquake; it is well known that the trembling of the earth is produced by the progress of a wave of the solid crust; that the destruction of buildings is caused by the undulation; and that the wave has been so evident, that it has been described as producing a sickening feeling on the observer, as if the land were but thin ice heaving over water. This mode of mountain formation has been explained, when treating of the Appalachians (q. v.), which were thus formed. Many other ranges have had a similar origin, as some in Belgium and in the Southern Highlands of Scotland, as has been suggested by Mr Carruthers.

It is evident that in the last two classes the parallel ridges were produced at the same time. Elie de Beaumont generalised this, maintaining that all parallel ridges or fissures are synchronous; and on this he based a system of mountain-structure, which is too universal and too geometrical to be true. The synchronism of parallel fissures had been noticed by Werner, and it is now received as a first principle in mining. The converse is also held to be generally true, that fissures differing in direction differ also in age; yet divergence from a centre, and consequent want of parallelism, as in the case of volcanoes, may be an essential characteristic of contemporaneity. Nevertheless, Elie de Beaumont classified the mountains of the world according to this parallelism, holding that the various groups are synchronous. The parallelism does not consist in having the same relations to the points of the compass—for these, as regards north and south, would be far from parallel—but is estimated in its relation to some imaginary great circle, which being drawn round the globe would divide it into equal hemispheres. Such circles he called Great Circles of Reference. But beyond this, he went a step further, and proposed a more refined classification, depending on a principle of geometrical symmetry, which he believed he had discovered among his great circles of reference. It is to be feared, however, that his geometrical speculations have little foundation in nature.

**MOUNTMELICK**, a market-town and seat of poor-law union, in Queen's County, province of Leinster, Ireland. It is situated on the river Owenass, a branch of the Barrow, 47 miles directly west-south-west from Dublin. The pop. in 1871 was 3315. The town has long been a chief seat of the Society of Friends, who established a manufactory of coarse woollen friezes and tweeds, by which many poor

children are employed. *M.* was also the seat of other manufactures, especially a foundry, a machine-factory, and a beet-root sugar factory, the results of which, however, were disappointing.

**MOURNE MOUNTAINS.** See **DOWN, COUNTY OF.**

**MOURNING**, a particular habit worn to express grief, especially for the decease of friends. The usages regarding mourning have varied much at different times and in different countries. Among the Jews, the duration of mourning for the dead was generally 7, but sometimes protracted to 30 days; and the external indications of sorrow consisted in weeping, tearing the clothes, smiting the breast, cutting off the hair and beard, lying on the ground, walking barefoot, and abstaining from washing and anointing themselves. Among the Greeks, the period was 30 days, except in Sparta, where it was limited to 10. The relatives of the deceased secluded themselves from the public eye, wore a coarse black dress, and in ancient times cut off their hair as a sign of grief. Among the Romans, the color of mourning for both sexes was black or dark blue under the republic. Under the empire, the women wore white, black continuing to be the color for men, who did not cut off the hair or beard as in Greece. Men wore their mourning only a few days; women a year, when for a husband or parent. The time of mourning was often shortened by a victory or other happy public event, the birth of a child, or the occurrence of a family festival. A public calamity, such as a defeat, or the death of an emperor or person of note, occasioned a public mourning, which involved a total cessation of business, called *Justitium*. In modern Europe, the ordinary color for mourning is black; in Turkey, violet; in China, white; in Egypt, yellow; in Ethiopia, brown. It was white in Spain until 1493. Mourning is worn of different depth, and for different periods of time, according to the nearness of relationship of the deceased. On the death of a sovereign or member of the reigning house, a court mourning is ordered; and in this country, it is usual at the same time to recommend the adoption of a general mourning.

In Scotch Law, if a husband die, whether solvent or insolvent, the widow will be entitled to a preferable payment out of the assets for mournings suitable to his rank. And the same privilege applies to mournings for such of the children as are to assist at the funeral. In England, there is no such privilege or distinction.

**MOU'SA**, an island of Shetland, remarkable for an object of antiquity styled *Burgh-Mousa*, which consists of a round tower of the class known in the north of Scotland as Pictish towers. *Burgh-Mousa* occupies a knoll close upon the rocky sea-beach, from which materials for its construction had been taken. The whole fabric is composed of flat slabs of clay-slate, which have been easily piled together in a compact mass without the aid of mortar. In exterior figure, the tower is round, inclining inwards about half-way up, and then bulging out near the top. Near the foundation, its circumference is 153 feet, and it measures about 40 feet in height. On the side next the sea, there is a doorway, and that is the only exterior aperture. If there were ever any door-posts, they have disappeared; it is feebly conjectured, however, that instead of employing a door, the inmates had, on emergencies, built up the opening, for which there is an abundance of loose materials at hand. Entering the doorway, we find the wall sixteen feet thick, and looking upwards, feel as if we were at the bottom of a well, for the circular interior has no flooring, and the top is open to the sky. Opposite the doorway, there is an entrance to a passage and stair, which wind upwards, within the thickness of the wall, to the summit of the building. At different places, there are recesses, or galleries, leading off from the stair, lighted by apertures to the interior; such dismal holes being all that we find in the way of apartments. It is customary to speak of an outer and inner wall; but the two walls, if we so distinguish them, are so firmly bound together by the stair and otherwise, as to afford a united resistance to assault. Obviously, the structure was used as a retreat in case of attack from foreign enemies, against whom missiles could be showered down from the species of battlement formed by the top of the well-knit walls. According to tradition, the tower of *Mousa* was occupied by Erlend, a Norwegian Jarl, about 1154, when it successfully endured a siege that was undertaken to recover a runaway lady; but how any lady could have found accommodation in such miserable quarters, it is difficult to conjecture. The Society of

Scottish Antiquaries deserves thanks for having repaired this fine memorial of a former state of society in Shetland. From its comparatively complete state, Burgh-Moussa is considered a good specimen of the Pictish towers, so called.

**MOUSE** (*Mus*), a genus of rodent mammalia of the family *Muridae* (q. v.), having three simple molar teeth in each jaw, with tuberculated summits, the upper incisors wedge-shaped, the lower compressed and pointed, the fore-feet with four toes and a rudimentary thumb, the hind-feet five-toed; the tail long, nearly destitute of hair, and scaly. This genus includes Rats (q. v.) and mice; the smaller species bearing the latter name.—The Common M. (*M. musculus*) is perhaps not originally British, although now so abundant everywhere. It accompanies man wherever he goes, and readily colonises every region, arctic, temperate, or tropical; its great fecundity, common also to most of its congeners, causing means to be employed everywhere for the prevention of its excessive multiplication. Aristotle made the experiment of placing a pregnant female M. in a closed vessel filled with grain, and found in a short time no fewer than 120 mice in the vessel. Of cats and mouse-traps it seems unnecessary here to speak, and equally unnecessary to give a description of the common mouse. There are several varieties of this species. That generally found in houses is smaller, and not so dark in color, as that common in barns and farmyards. A white variety sometimes occurs, and has been perpetuated in a half-domesticated state. The common brown kind is, however, at least as easily tamed, and readily becomes familiar enough. A pied variety is not uncommon in India.—Much has been written about the singing powers of the M.; it being asserted, on the one hand, that mice not unfrequently shew a strong love for music, and a power of imitating the song of birds; whilst, on the other hand, it is alleged that the singing of mice is merely the consequence of throat disease.—The M. makes a nest like that of a bird in the wainscot of a wall, among the chaff or feathers of a bed, or in any similar situation. The litter is generally from six to ten in number.—The Wood M., or LONG-TAILED FIELD M. (*M. sylvaticus*), is a little larger than the Common Mouse. Its tail is longer; its ears are also longer; its muzzle rather longer; its under-parts lighter in color, than in the common mouse. It is abundant throughout Britain and the temperate parts of Europe, and is a grievous pest in gardens and fields. It lays up stores of grain and other food, either in thick tufts of grass, or just under the surface of the earth. The quantity of food laid up in such stores is often wonderfully large. The Field M. is timid, gentle, and easily tamed.—The smallest British M., and the smallest British quadruped, is the HARVEST M. (*M. messorius*), of which the head and body are only  $2\frac{1}{2}$  inches in length, the tail being almost equally long, and to some degree prehensile; the general form elongated and slender, the head narrow, the ears not large. This species is not uncommon in some parts of the south of England; it is also found in the south of Scotland, although less frequently. It makes its nest among the stalks of wheat, reeds, or other grasses, weaving together the leaves and panicles of grasses, the leaves being for this purpose cut into shreds by its teeth. The nest is a very curious structure formed by mere intertwining, without cement of any kind. It is generally suspended among the stalks. It is globular, or nearly so, and entrance to it is through an opening, which almost completely closes up again.—A still smaller species of M. (*M. pumilus*) is found in the south of Europe.—An American species, the WHITE-FOOTED M. (*M. leucopus*), common in most parts of North America, and intermediate in its habits between the Common M. and the Field M., is said to depart from houses whenever either the cat or the brown rat appears in them.—The Barbary M. (*M. barbarus*) approaches in size to the rats, and is distinguished by its longitudinally striped fur.

The name M. is often popularly given to animals considerably different from the true mice, as the *Voles* (q. v.).

**MOUSE-EAR CHICKWEED** (*Cerastium*), a genus of plants of the natural order *Caryophyllaceae*, having five sepals, five bifid petals, ten stamens, five styles, and a capsule bursting at the top with ten teeth. The species are numerous, natives of temperate and cold countries in all parts of the world. Some of them are among the most common weeds in Britain; others, having larger flowers, are occasionally

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planted in flower-borders and on rock-works. The form and hairiness of the leaves of some of the British species have given rise to the popular name.

**MOUTH**, Diseases of the, occur in different forms, but usually begin with inflammation of the mucous membrane. The inflammation may be equally diffused, or may be chiefly or entirely confined to the mucous follicles. When diffused, it may either present no peculiar secreted product, or the surface may be covered with a curd-like secretion, or with patches of false membrane. It may further be attended with eruption, ulceration, or gangrene, any one of which may impress a special character on the disease, or it may present peculiarities from the nature of its exciting cause, as when it accompanies scurvy, or is the result of mercurial action.

The following are the principal forms of inflammation of the mouth, or *stomatitis* (Gr. *stoma*, the mouth), as it is termed by nosologists. 1. *Common Diffused Inflammation*, which appears in reddened, somewhat elevated patches, and sometimes occupies large portions of the surface of the mouth. It is more commonly a complication of other diseases than an original affection. When of the latter character, it is generally caused by the direct action of irritants, as by scalding drinks, corrosive substances introduced into the mouth, accumulated tartar on the necks of the teeth, &c. In ordinary cases, cooling and demulcent liquids (such as cream or almond oil) applied locally, an occasional saline cathartic, with a soft and chiefly farinaceous diet, constitute the whole of the necessary treatment.

2. *Diffused Inflammation, with curd-like exudation*, is almost entirely confined to infants, and is described under its popular name of **THRUSH**.

3. *Inflammation of the Follicles, and Eruption or Vesicular Inflammation*, are described in the article **APTHÆ** (q. v.).

4. In *Ulcerative Inflammation, Cancrum Oris, or Canker*, an ulceration, often of considerable size, with a grayish surface and an inflamed edge, appears on the gums, or inside of the cheeks or lips. The swelling of the adjacent parts is often so considerable, as to be apparent externally. There is a copious flow of saliva, and the breath is very offensive. The disease generally occurs in children from two to six years of age. The ulcer may continue for weeks, or even months, but always yields to treatment. The febrile symptoms and the constipation which are usually present, must be combated in the ordinary way. Perhaps the best general method of treating the disease is by the administration of chlorate of potash (four or five grains in sweetened water every four hours), and by frequently washing the mouth with a weak tepid solution of chlorinated soda.

5. The preceding affection is sometimes the first stage of a much more serious affection—viz., *Gangrene of the Mouth*, which usually occurs in children between the first and second dentition. A sloughing ulcer forms upon the gums or some other part of the mouth. This slough spreads, the breath becomes extremely fetid, the disease extends to the alveolar processes, and the teeth are loosened and fall out. Inability to take food is followed by exhausting diarrhoea, and death is the usual termination. Unless taken in the early stage, when tonics and the local application of caustics may be serviceable, the disease is generally fatal.

Other affections of the mouth are noticed in the articles **SALIVATION** and **SCURVY**.

**MOVABLES**, in Scotch law, is the technical term to denote personal as contradistinguished from heritable property, one of the main distinctions of property being between these two classes. Heritage goes to the heir-at-law in case of intestacy, or what is equivalent to it, and movables go to the next of kin. See **KIN**. The term movables is thus not confined to corporeal things, as furniture, cattle, goods, &c., but includes debts, bills of exchange, rights of action, &c.

**MOVILLE**, a small market-town of Ireland, in the county of Donegal, on Lough Foyle, 18 miles n. n. e. of Londonderry. It is a calling-station of the Transatlantic steam-packets of the Anchor and Allan lines. Pop. (1871) 1308.

**MOVING PLANT** (*Desmodium gyrans*), a plant of the natural order *Leguminosæ*, suborder *Papilionaceæ*, a native of India, remarkable, as are also some other species of the same genus, for the spontaneous motion of the leaves. The leaves are ternate, the lateral leaflets much smaller than the terminal one. These lateral leaflets are in constant motion, being elevated by a succession of little jerks till they meet above the terminal leaflet, and then moving downwards by similar rapid jerks to

the leaf-stalk. Sometimes one leaflet is in motion and the other at rest. Sometimes a few may be seen moving, whilst there is a partial cessation in the other leaves of the plant. A high wind causes this cessation more than anything else; the movements are more languid in a very hot dry day, and are to be seen in their perfection in warm moist weather. The terminal leaflet does not remain absolutely at rest, although its movements are not like those of the lateral ones, but oscillates slowly from one side to the other. Concerning these remarkable movements, nothing more than the fact that they take place can yet be said to be known.

MOXA is a peculiar form of counter-irritation which was early practised in the East, particularly by the Chinese and Japanese, from whom it was learned by the Portuguese. One or more small cones, formed of the downy covering of the leaves of *Azadirachta indica* (as used by the Chinese), or of the pith of various plants (as of the common sun-flower), or of linen steeped in nitre, are placed on the skin over the affected part, and the ends remote from the skin are ignited. The combustion gradually proceeds through the cone and forms a superficial eschar on the skin. The surrounding parts must be protected by a pad of wet rag, with a hole in it for the moxa.

It may be employed with advantage in certain forms of neuralgia (especially obstinate sciatica) and paralysis, and in chronic diseases of the joints. It is not much used in consequence of its apparent severity, but the pain is not so great as might be expected, and, according to some of its advocates, is less than often attends blisters.

MOZAMBIQUE, a territory on the east coast of South Africa, nominally belonging to Portugal, and placed under a governor-general, although the actual possessions of Portugal consist only of a few stations, and her authority in the country is inconsiderable. It extends from Cape Delgado, in lat.  $10^{\circ} 41'$  s., to Delagoa Bay,  $26^{\circ}$  s. The chief river, the Zambezi, divides it into two portions—M. proper on the north, and Sofala on the south. Area estimated at 233,500 square miles; pop. 300,000. These figures, however, are only to be considered approximative, as the country has no definite boundary to the west. The coasts, which comprise large tracts of cultivated soil, yielding rich harvests in rice, are fringed with reefs, islands, and shoals, and between Delagoa Bay and Cape Corrientes, and from M., the principal station, to Cape Delgado, the shores are high and steep. The forests yield valuable ornamental woods; ivory is obtained from the hippopotami that haunt the marshes; and gold and copper are found and worked. The elephant, deer, and lion inhabit the jungle; crocodiles are found in the rivers, and numerous flamingoes on the coasts. The rainy season lasts from November to March. The summer heat is very great, and the climate, which is fine in the elevated tracts, is unhealthy on the low shores and the swampy districts. Besides numerous fruits and vegetables, the grains are rice, millet, maize, and wheat. The government is in a most inefficient state, being, in most places, more in the hands of native chiefs than of the Portuguese. In former times the slave-trade was carried on here extensively; and from 1846 to 1857, four governors-general were removed by their government for countenancing, if not actively engaging in it. The colony is divided into six districts, and is ruled by the governor-general and his secretary, assisted by a *junta*. Religion and education are supervised by about twelve Roman Catholic priests, but seem to be at the lowest ebb. Fish and turtle are caught in great quantities on the islands and reefs; pearl-fishing is a source of considerable profit; cattle, sheep, and goats are numerous, and the principal exports are grain, gold-dust, honey, tortoise-shell, cowries, gums, and amber. The Portuguese arrived here in 1497, attracted by rumors of the wealth of the country and the excellence of its ports. The principal settlements are Mozambique, Quillimane, Sena, and Tete.

MOZAMBIQUE, the capital of the Portuguese territory of the same name, is situated on a small coral island, on the eastern coast of Africa, close to the shore, in lat.  $15^{\circ} 3'$  s. It is defended by three forts, is well built, and contains a large square in which the palace of the governor and the custom-house are the chief buildings. Pop. 8500, of whom 7000 are slaves, 270 Christians, 102 Banyans from Hindustan, and 1150 Arabs. In former times all the markets of the world were supplied with slaves from Mozambique. Its commerce, now inconsiderable, is chiefly with India, and is carried on by Arabs.



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**MOZAMBIQUE CHANNEL**, between the island of Madagascar and the south-eastern coast of Africa, is about 1000 miles in length, and about 450 in average breadth. At its northern extremity are the Comoro Islands. Over the northern portion the monsoons blow. Black whales, yielding spermaceti, abound.

**MOZARABIAN LITURGY**, a liturgy—traced back by some to the apostles, but by the majority of writers to St Isidore of Sevilla, who redacted it, in co-operation with the Fathers of the 4th Council of Toledo, 633—originally in use among those Christian inhabitants of Spain (Muzarabians, Mostarabians, Mustarabians) who remained faithful to their religion after the Arabic conquest. It is also called the Gothic Liturgy, and differs in some respects from the Roman. Gregory VII. first compelled most of the Spanish churches and convents to adopt the common uniform liturgy of the Romish Church. Six Mozarabic congregations alone, chiefly in Leon and Toledo, were allowed to retain their ancient ritual, but it soon fell into disuse even among these. Archbishop Ximenes of Toledo expressly founded a chapel at Toledo, in 1500, in which mass was to be said according to the Mozarabian manner, lest it might entirely fall into oblivion. He further caused a number of learned priests, Alfonso Ortiz among them, to collate all the different Mozarabian liturgical MSS. to be found in the different churches, chapels, and convents, and finally, there was edited, under his auspices, the "*Missale Mistum secundum Regulam Beati Isidori Dictum Mozarabicum*" (1500—1502), which has, however, by some unfortunate accident, remained incomplete. A whole third of the church-year is left out entirely. The peculiar affinity of this liturgy with the Gallican on the one, and the Greek on the other hand, makes its study extremely important for the history of the ancient Church.

**MOZART**, Johann Chrysostom Wolfgang Gottlieb, one of the greatest of musical composers, was born, 27th January 1756, at Salzburg, where his father was sub-director of the archiepiscopal chapel. His extraordinary musical talents were cultivated to the utmost by his father. At the age of four he played the clavicord, and composed a number of minuets and other pieces still extant. When only six years of age, his performances were so remarkable, that his father took him and his sister, who possessed similar gifts, to Munich and Vienna, where they obtained every kind of encouragement from the elector of Bavaria and the Emperor Francis I. In 1763 and 1764, the Mozart family visited Paris and London. At the age of seven, young Mozart surprised a party of musicians, including his father, by taking part, at sight, in a trio for stringed instruments. Symphonies of his own composition were produced in a public concert in London; and whilst there, he composed and published six sonatas, and made acquaintance with the works of Handel, recently deceased. Two years later, when but twelve years of age, he composed the music for the religious service and for a trumpet concert at the dedication of the Orphan House Church in Vienna, and conducted it in presence of the imperial court. In 1769, at the age of thirteen, he was appointed director of the Prince Archbishop of Salzburg's concerts; and in the same year travelled with his father to Italy, where he created an unheeded enthusiasm by his performances and compositions. He composed the opera of *Mithridates* at Milan, in October 1770, and it was publicly performed there in December of that year. At the age of sixteen, he was the first claricinet in the world; he had produced two requiems and a stabat mater, numerous offertories, hymns, and motets, 4 operas, 2 cantatas, 13 symphonies, 24 pianoforte sonatas, not to speak of a vast number of concertos for different instruments, trios, quartetts, marches, and other minor pieces. In 1779, he was appointed composer to the imperial court at Vienna, where he then fixed his residence, and there the musical works were composed upon which his great fame chiefly depends. His office in Vienna, however, was rather honorary than lucrative, and he lived by concerts, musical tours, teaching of music, and the small profits derived from the sale of his published works, till an offer of a large salary made to him by the king of Prussia led the emperor to give him 800 florins a year. His great opera of "*Idomeneo*" was composed in 1780, with a view to induce the family of Mademoiselle Constance Weber, afterwards his wife, to consent to the marriage, which they had declined on the ground of his reputation not being sufficiently established. This opera forms an epoch not in the composer's life only, but in the history of music. In construction, detail, instrumentation, and every imaginable respect, it was an enormous advance

on all previous works of the kind, and established his repute as the greatest musician whom the world had seen. "Die Entführung aus dem Serail" followed. His six quartetts, dedicated to Haydn, appeared in 1785, and in 1786 "Le nozze di Figaro." In 1791, he produced his "chef-d'œuvre," "Don Giovanni," which, though received with enthusiasm at Prague, was at first beyond the comprehension of the Viennese. "Così fan tutti" appeared in 1790. To 1791, the last year of his short life, we owe "Zauberflöte," "La Clemenza di Tito, and the sublime requiem composed in anticipation of death, and finished only a few days before his decease. He died on 5th December 1791, aged 35.

In the intervals of his greater works, M. composed the majority of the orchestral symphonies, quartetts and quintetts, which are an almost indispensable part of the programme of every concert in the present day, besides masses as familiar in England as in Catholic Europe, innumerable pianoforte concertos and sonatas, and detached vocal compositions, all of the most perfectly finished description. To Haydn M. always acknowledged his obligations; but Haydn's obligations to M. are at least as great. Haydn, though born twenty-four years earlier, survived M. eighteen years, and all his greatest works, written after M.'s death, bear manifold traces of M.'s influence. M. is the first composer in whose works all traces of the old totality disappear; he is the father of the modern school. "No composer has ever combined genius and learning in such perfect proportions; none has ever been able to dignify the lightest and trifest forms by such profound scholarship, or at the moment when he was drawing most largely on the resources of musical science, to appear so natural, so spontaneous, and so thoroughly at his ease."—"Hullah." See Holmes' "Life of Mozart" (Lond. 1945); Otto Jahn's "Life of Mozart" (Leip. 1856).

MOZDO'K, a town and fortress of South Russia, in the government of Caucasus, about 142 m. north of Tiflis. Pop. (1867) 8543, chiefly Armenians.

MOZY'R, a town in the south-east of the government of Minsk, in European Russia, 150 miles south-south-east of Minsk, is situated on the left bank of the Pripet, a tributary of the Dnieper. It is a town of considerable antiquity, and played a rather important part in the wars between the various Russian princes, previous to the Tartar invasion. It was unsuccessfully besieged by the Tartars in 1240. Under the Polish rule it was the chief town of a district, and remained so after its annexation to Russia in 1795. 150 barges and 900 rafts are annually freighted here with goods to the amount of 500,000 rubles. Pop. (1867) 5250.

MSKET, also written Mitsche'tha and otherwise, one of the most ancient Georgian towns, in the present government of Tiflis, and about 10 miles north-north-west of the town of that name. It is said to have been the seat of the Georgian kings down to the 5th c., and contained the first Christian church of Georgia, built during the first half of the 4th century. In this church the Georgian kings were crowned and buried. The site of M. is now marked by a few huts.

MTZENS'K, a town of Russia,, in the government of Orel, 646 miles south-south-east of St Petersburg. It is situated on the Zusha, which communicates through the Oka with the Volga. The old cathedral, built on a steep rock, gives picturesque-ness to the town. M. receives historical mention as far back as 1147. Its trade, chiefly with St Petersburg and Moscow, amounts in value to upwards of 1,000,000 rubles. Pop. (1867) 13,373.

MUCH WOO'LTON (i. e., *Great Woolton*), a town of Lancashire, England, six miles from Liverpool. The town is rapidly increasing in size on account of the proximity of a branch of the North-Western Railway, which runs within two miles. M. W. has long been noted for a stone obtained from a neighboring quarry, which gives employment to a considerable number of men. Pop. (1871) 4643. Near M. W. is the village of Little Woolton, with a pop. of about 1000.

MU'CILAGE, or Bassorin ( $C_{12}H_{10}O_{10}$ ), is a modification of gum which is insoluble in water, but when moistened with it, swells up into a gelatinous mass. It is contained abundantly in gum tragacanth; and many seeds, such as linseed, quince seed, &c., and certain roots, such as those of the marsh mallow, furnish it in large quantity. Alkalies render it soluble in water, and convert it into true gum; and prolonged boiling in water produces the same effect. Nitric acid converts it into mucic and oxalic acids.

**MUCKERS**, the popular name of an extraordinary sect, which sprung up at Königsberg, in Germany, in 1835. The movement seems to have originated in the dualistic and Gnostic views of John Henry Schöuberr (who was born at Memel in 1771, and died at Königsberg in 1826) concerning the origination of the universe by the combination of two spiritual and sensual principles. His followers carried out his system much more completely than himself. The most notable of them were two clergymen, Ebel and Diestel, the former an archdeacon. By their sexual connection would seem to have been elevated into an act of worship, and the chief means of the sanctification of the flesh, by which the paradisiac state was to be restored. Ebel and Diestel founded a society, to which women—some of noble birth—attached themselves. Three ladies lived in Ebel's house, who were popularly regarded as his three wives; and Mr Hepworth Dixon, in his work entitled "*Spiritual Wives*" (1868), tells us that one of them, a young widowed countess, whose beloved husband had fallen on the field of Lützen, and whom he enticed from the seclusion and deep melancholy in which she lived, was described by him as representing to him the principal of Light (*Licht-natur*); another of the ladies represented the principle of Darkness (*Finatniss-natur*); and the third represented the principle of Union (*Umfassung*). The last was his legal wife, but held the most subordinate place in his extraordinary household. Ere long, public feeling was excited against the M., who were said to be guilty, under forms of piety, of the most odious licentiousness in their meetings. The scandal became great in Königsberg, and a garden there acquired the name of the Seraphs' Grove. The subject was brought before the courts (1839—1842), and the result was that Ebel and Diestel were degraded from their offices, and the latter was further punished by imprisonment. It is alleged, however, by some who have examined the whole evidence produced, that the decisions did not proceed upon a calm judicial inquiry, but were dictated by strong prejudice against the accused, on account of their religious views and peculiar eccentricities; and, in particular, that the evidence gives no support whatever to the charge of licentiousness. Mr Hepworth Dixon has directed attention to the similarity of the Mucker movement with that of the Princeites (See **AGAPEMONE**) in England, and that of the Bible Communists or Perfectionists (q. v.) in America, all of which took place about the same time, and in connection with revival excitement, although it may almost be regarded as certain that the originators of these movements had not even heard of each other.

**MUCOUS MEMBRANES AND MUCUS.** Under the term **MUCOUS SYSTEM**, anatomists include the skin, mucous membranes, and true glands, all of which are continuous with one another, and are essentially composed of similar parts. As the skin and the glands are described in special articles, it only remains to speak of the great internal mucous tracts. These are the alimentary mucous membrane, the respiratory mucous membrane, and the genito-urinary mucous membrane.

The *alimentary mucous membrane* commences at the lips, and not only forms the inner coat of the intestinal canal from the mouth to the anus, but gives off prolongations which after lining the ducts of the various glands (the salivary glands, the liver, and the pancreas) whose products are discharged into this canal, penetrate into the innermost recesses of these glands, and constitute their true secreting element. Besides these larger offsets, we find in the stomach and small intestine an infinite series of minute tubular prolongations, the anatomical arrangement and function of which are described in the article **DIGESTION**.

The *respiratory mucous membrane* begins at the nostrils, and under the name of *schneiderian* or *pituitary membrane*, lines the nasal cavities, from whence it sends on either side an upward prolongation through the lacrymal duct to form the *conjunctiva* of the eye; backwards, through the posterior nares (the communication between the nose and the throat), it sends a prolongation through the Eustachian tube to the middle ear (the cavity of the tympanum), and is continuous with the pharyngeal mucous membrane (which is a portion of the alimentary tract); it then, instead of passing down the œsophagus, enters and forms a lining to the larynx, tracheæ, and bronchial tubes to their terminations. From the continuity of these two tracts, some writers describe them as a single one, under the name of the *gastro-pulmonary tract*.

The *genito-urinary mucous membrane* commences at the genito-urinary orifices,

lines the excretory passages from the generative and urinary organs, and is the essential constituent of the glands of both. See KIDNEY, for example.

We thus see that mucous membranes line all those passages by which internal parts communicate with the surface, and by which matters are either admitted into or eliminated from the body. As a general rule, they are soft and velvety, and of a more or less red color, from their great vascularity, but they present certain structural peculiarities according to the functions which they are required to discharge. In all the principal parts of the mucous tracts we find the mucous membrane to present an external layer of Epithelium (q. v.) resting on a thin, transparent, homogeneous membrane, which from its position is termed the *basement membrane*, and beneath this a stratum of vascular tissue of variable thickness, which usually presents either outgrowths in the form of papillæ and villi, or depressions or inversions in the form of follicles, or glands, or both. The follicles are almost invariably present, but the papillæ and villi are limited to the alimentary or gastro-intestinal mucous membrane. "The mucous membranes," says Dr Carpenter, "constitute the medium through which nearly all the material changes are effected that take place between the living organism and the external world. Thus, in the gastro-intestinal mucous membrane we find a provision for reducing the food by means of a solvent fluid poured out from its follicles; whilst the villi, or root-like filaments, which are closely set upon its surface towards its upper part, are specially adapted to absorb the nutrient materials thus reduced to the liquid state. This same membrane, at its lower part, constitutes an outlet through which are cast out not merely the indigestible residuum of the food, but also the excretions from numerous minute glandulæ in the intestinal wall, which result from the decomposition of the tissues, and which must be separated from them to prevent further decay. Again, the bronchio-pulmonary, or respiratory mucous membrane, serves for the introduction of oxygen from the air, and for the exhalation of water and carbonic acid. And, lastly, the mucous membranes are continuous with the cell-lined vesicles or tubes of the various glands, which are the instruments whereby their respective products are eliminated from the blood." Although the various kinds of epithelial cells discharge a special office in relation to the peculiar function of the mucous membrane upon which each kind occurs, yet they all serve one general purpose—namely, that of protecting the surfaces on which they are placed. This protecting power is increased by the presence of the secretion known as *mucus*, which ordinarily forms an extremely thin layer on these membranes, but when they are irritated or inflamed, is secreted in very considerable quantity. The exact mode of its formation is still a disputed question, but it is generally believed to be the product of the gradual solution of the uppermost epithelial cells. Besides acting both mechanically and chemically as a shield to highly sensitive membranes, it has other uses, amongst which two may be especially mentioned—1. It communicates to the salivary, and probably to other glands, properties which are not possessed either by itself or by the pure glandular secretions; and 2. It serves to eliminate a considerable quantity of nitrogen from the system. This nitrogen is contained in the *mucin*, which forms from 2·4 to 9 per cent. of nasal and bronchial mucus. This mucin contains 12·64 per cent. of nitrogen, and is the substance which gives to mucus its viscid and tenacious character. Normal mucus is devoid of smell and taste, and almost, if not quite, neutral; and hence its constant presence in the mouth gives rise to no disagreeable sensation.

MU'DAR (*Calotropis*), a genus of shrubs of the natural order *Asclepiadaceæ*, distinguished by a coronet of fine blunt processes adhering to the base of the filaments. They are natives of the East Indies, and the bark of the root, and the inspissated milky juice of some of them, are much used there as an alterative, purgative, emetic, and sudorific medicine. The medicinal properties of *M.* have been well known in India for many centuries, and have begun to attract the attention of European physicians. It is found of great value in elephantiasis, and in leprosy and other obstinate cutaneous diseases, as well as in some spasmodic affections, and in syphilis.—The species most common in the south of India is *C. gigantea*; in the north, *C. Hamiltonii*; whilst *C. procera*, said to have an extremely acrid juice, extends into Persia, and even into Syria. *M.* is very common in India, springing up in uncultivated ground, and often troublesome in that which is cultivated. It is a large shrub, with stems often thicker than a man's leg; and broad fleshy leaves.

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It grows where almost nothing else will, on very dry sands, and rapidly attains a large size. The silky down of the pods is used for making a soft, cotton-like thread; but is short, and not easily spun. The inner bark also yields a strong and useful fibre, which makes excellent cordage and fishing-lines; but the mode of preparation hitherto used makes it costly.—The inspissated milky juice of *M.*, collected by making incisions in the bark, is used as a substitute for caoutchouc and gutta-percha. It becomes flexible when heated.—The *M.* of medicine contains a principle called *Mudarine*, on which its medicinal virtues are supposed to depend, and which possesses the rare property of gelatinising when heated, and becoming fluid when again cooled.

**MUD-FISH** (*Amia*), a very curious genus of fishes, forming the family *Amiidae* of the order *Ganoidet* of Müller, although its position among the *Ganoidet* is determined only by anatomical characters, in which it agrees with sturgeons and the rest of that order, for the scales are not ganoid, and are not osseous plates, but are flexible and rounded, and destitute of enamel. Similar scales, however, are found in fossil genera regarded by Agassiz as ganoid. In habit, the *M.* resembles osseous fishes rather than ganoids. Except in the absence of teeth on the tongue, the mouth resembles that of a trout. The body is long and flexible, with a bony vertebral column; there are two nasal cirri; the head is flat, covered with a very thin mucous skin, immediately under which the bones appear as sculptured plates. More than ten species are known, natives of the fresh waters of America. The **WESTERN M.** (*A. calva*) is from a foot and a half to three feet long, bluish-black above, white below. It inhabits the great northern lakes of North America, and is found as far south as Carolina. It feeds chiefly on crawfish and other crustaceans. It is not esteemed as an article of food, although sometimes used by the Indians.

**MU'DKI**, usually spelled **MOODKEE**, a small town of north-west Hindustan, 23 miles south-east of the Sutlej, and 70 miles south-east of the city of Lahore, on the Ravi. It has a pop. of about 6000. Here the first battle in the Sikh war of 1845—1846 was fought (18th December 1845), when the British under Sir Hugh Gough repulsed the Sikhs, and Sir Robert Henry Sale, "Fighting Bob," was killed.

**MUE'DDIN** (*Mu'izzin*), the Arabic name of the Mohammedan official attached to a mosque, whose duty it is to announce the different times of prayer. His chant (*Adan*) consists of these words, repeated at intervals: "Allah is most great. I testify that there is no God but Allah. I testify that Mohammed is the Apostle of Allah. Come to prayer. Come to security." ["Prayer is better than sleep" is added in the morning, at the Subh or Fegh. See **MOHAMMEDANISM**.] "Allah is most great. There is no deity but Allah!" Besides these regular calls, two more are chanted during the night for those pious persons who wish to perform special nightly devotions. The first (*Ula*) continues after the usual *Adan*, in this manner: "There is no deity but Allah! He hath no companion—to Him belongeth the dominion—to Him belongeth praise. He giveth life and causeth death. And He is living and shall never die. In His hand is blessing, and He is almighty," &c. The second of these night calls (*Ebed*) takes place an hour before daybreak, and begins as follows: "I extol the perfection of Allah, the Existing for ever and ever: the perfection of Allah, the Desired, the Existing, the Single, the Supreme," &c. The office of a *M.* is generally intrusted to blind men only, lest they might, from their elevation, have too free a view over the surrounding terraces and harems. The harmonious and sonorous voices of the singers, together with the simplicity and solemnity of the melody, make a strikingly poetical impression upon the mind of the hearer in daytime; much more, however, is this the case whenever the sacred chant resounds from the height of the mosque through the moonlit stillness of an eastern night.

**MU'FTI** (Arabic, *Expounder of the Law*). The Turkish grand Mufti is the supreme head of the Ulemas (servants of religion and laws), and has, together with the Grand Vizir (Vizer Azim), the supreme guidance of the state, nominally ruled by the sultan. His is the chief spiritual authority, and in this capacity he is also denominated Sheikh-ul-Islam (Lord of the Faith). The Imams (priests), however, chosen from the body of the Ulemas, are, from the moment of their official appointment, under the authority of the Kislar-Aga, or Chief of the Black Eunuchs. The better class of the Ulemas are the teachers and expounders of the law, from among whom

the Mollahs and Cadis are elected. The Turkish laws have their basis in the Koran; the Mufti thus, as head of the judges, acquires a spiritual authority. His also is generally the office of girding the sultan with the sword at his ascension to the throne, a ceremony which takes place at the Mosque of Eyub, and which is equal to our ceremony of coronation. The Mufti is elected and may be deposed by the sultan, and his position has in modern days lost much of its former dignity and importance. His Fetwa, or decision, although attached to the imperial decrees, imparts to it but little additional weight. Nor is his own dictum in things spiritual always considered as finally binding. The only prerogative of Muftis and Ulemas which has hitherto remained untouched, is their being exempt from bodily or otherwise degrading punishments; nor can their property ever be confiscated, but descends to their successors.

**MUGGLETONIANS**, a sect that arose in England about the year 1651, and of which the founders were John Reeve, and Ludovic Muggleton (born 1607, died 1697), obscure men, but who claimed to have the spirit of prophecy. Muggleton was a journeyman tailor. He professed to be the "mouth" of Reeve, as Aaron was of Moses. They affirmed themselves to be the *two witnesses* of Rev. xi. They asserted a right to curse all who opposed them, and did not hesitate to declare eternal damnation against their adversaries. They favored the world with a number of publications, one of which—particularly directed to the Parliament and Commonwealth of England, and to His Excellency the Lord General Cromwell—was entitled a "Remonstrance from the Eternal God." The prophets were at that time imprisoned as nuisances "in Old Bridewell." Another publication was a "General Epistle from the Holy Spirit," dated from "Great Trinity Lane, at a Chandler's Shop, overagainst one Mr Millis, a Brown Baker, near Bow Lane End, London." [The first complete edition of M.'s works was published in 1756; another edition appeared in 1832.] The M. denied the doctrine of the Trinity; they held anthropomorphist opinions; and to all this they added many strange doctrines of their own, as that the devil became incarnate in Eve, &c. The M. existed in England as a sect till more than one-fourth of the 19th c. had passed away; but the census of 1851 shewed no trace of them, and they are supposed to be now completely extinct.

**MUHALITCH**, or Mualich, a town of Asia Minor, in Anatolia, 18 miles south of the Sea of Marmora, and 37 miles west of Brusa, picturesquely situated on low hills. It is large and straggling, contains about 1500 houses and three or four khans, and is the seat of a considerable trade, chiefly in exporting silks, wool, and fruits to Constantinople. Pop. 11,000.

• **MUHESUR**, a town of India, in the territory of Indore (q. v.), on the right bank of the Nerbudda, 290 miles north-east of Bombay. The fort contains many houses within its enclosure, but is in bad repair. There is a new palace, built of gray basalt, and overcharged with sculptures of human beings, and of elephants, tigers, and other animals. There are also numerous and costly Hindu temples, erected by Abaya Bai, relict of Kunda Rao, son of Maharajah Mulhar Rao. The river, which is here about 2000 feet wide, has a rapid stream of blue water, rushing over a rocky bottom; the banks are 60 or 80 feet high in the dry season. Access to the water is gained by a ghât, or vast flight of stone stairs, which extends below the water at its lowest level. Pop. about 17,000.

**MÜHLBERG**, a town of Prussian Saxony, situated on the Elbe, 36 miles south-east of Wittenberg. Pop. (1871) 3244. Here, on 24th April 1547, a battle was fought between Johann-Friedrich, Elector of Saxony, and the Emperor Charles V.—a battle fraught with the most important results to the cause of Protestantism in Germany. The battle was soon decided in favor of the emperor, Johann-Friedrich was taken prisoner, and his territories were handed over to Maurice, the representative of the ducal family of Saxony. From this time till 1552, the Catholics were triumphant in Germany.

**MÜHLHAUSEN**, an ancient city of Prussia, in the principality of Eichsfeld, on the Unstrut, 20 miles north-west of Erfurt. It ranked in the middle ages as an important imperial free city, and is still an active centre of commerce. It has manu-

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factories for linen and woollen goods, starch, anise, and saffron works, and carpet and leather factories. Pop. (1871) 19,516. M. was deprived of its municipal independence in 1803, and made over to Prussia, with which it has since remained incorporated, excepting for a short period during the predominance of French influence in Germany, when, at the suggestion of Napoleon, it was included in the kingdom of Westphalia, but it was restored to Prussia in 1813.

MÜHLHEIM, the name of two manufacturing towns of Rhenish Prussia, distinguished from each other as *M. an der Rhur*, and *M. am Rhein*. The former, situated on the river Rhur, 16 miles north of Düsseldorf, is a flourishing town, chiefly important on account of its trade in Rhur coal. Excellent river-steamers are built here. Sandstone is extensively quarried, and ironworks and machine-factories are in operation. Cotton-spinning, weaving, printing, tanning, and paper-making are carried on. Pop. (1871) 14,267. *M. am Rhein*, nearly opposite Cologne, carries on extensive manufactures of silk goods (employing 500 looms); there are dye-works and paper and oil mills in operation, and considerable trade and commerce. Pop. (1871) 13,511.

MUIRBURN, in Scotch Law, is the crime of setting fire to heather. Neither owners nor tenants, except in high and wet lands, are entitled to set fire to heather between 11th April and 1st November, though at other times they may. And persons who wilfully fire heather are liable to be fined and imprisoned. In England, maliciously setting fire to heaths is one of the heads of the generic offence of Arson (q. v.).

MUKDEN, or Moukden, in lat. 41° 50' 30" n., long. 123° 37' e., the capital of Shêng-king, the chief province of Manchuria. Its Chinese name is Taungien-foo, signifying *affluent capital*, a translation of the Manchu Moukden, meaning *fourishing*. It lies on a branch of the river Liao, about 500 miles north-east of Peking. The town is surrounded by a wall about 10 miles in circumference, including an inner wall 3 miles in circuit, enclosing the emperor's summer residence. Great pains have been taken by the emperors to enlarge and beautify this the metropolis of the Manchu race, but with only partial success. The family residence and place of sepulture of the founders of the reigning dynasty is Hingking, about 60 miles east of Mukden. It is pleasantly situated in a mountain valley near the palisade which separates the provinces from Kirin. The emperor Kienlung rendered himself celebrated among his subjects, and the city of M. better known abroad, by a poetical eulogy upon the city and province, which was printed in 64 different forms of Chinese writing. In 1681, M. became the seat of government of the Manchu emperors, and is now the seat of several superior tribunals of a Chinese viceroy of the first rank. Nineteen leagues from M. is its port, Niuchwang, or Newchwang (more correctly known as Ying-tz, i. e., "camp" or "military station"), which has been opened recently to foreign commerce. It is shallow, difficult of access, and during many months of the year closed by ice. Pulse, cattle, and drugs are its chief exports. The trade with Great Britain is steadily developing, and forms already about one-third of the whole. According to the consular reports for 1876, the total value of the exports for that year amounted to £395,900 (only £18,300 for foreign ports): the total value of imports was £941,500 (£590,000 from foreign countries). Coal and iron are worked in the province, and are beginning to find a market in Newchwang.

MULATTO. See MIXED RACES.

MULBERRY (*Morus*), a genus of trees of the natural order *Moraceæ*, natives of temperate and warm climates, with deciduous leaves, unisexual flowers in short, thick spikes, a 4-parted perianth, containing either four stamens or one pistil with two styles, the perianth of the female flowers becoming succulent and closing over the small pericarp, the whole spike coalescing into an aggregate fruit.—The COMMON M., or BLACK M. (*M. nigra*), is a native of the middle parts of Asia, but was introduced into the south of Europe more than a thousand years ago, and is now almost naturalised there. It is a low tree, much branched, with thick rough bark, and broad heart-shaped leaves, which are unequally serrated, and very rough. It is cultivated in the middle parts of Europe, and succeeds well in the south of England, but in the northern parts of Britain it requires a wall. The perianth and stigmas are roughly ciliated, and the fruit is of a purplish-black color, with dark red juice,

fine aromatic flavor, and subacid sweet taste. The fruit is much esteemed for dessert; an excellent preserve and a pleasant light wine are made of it. The tree often produces its fruit in prodigious quantity. The wood is employed in cabinet-work, but is not of much value. The leaves are sometimes used for feeding silk-worms. The Black *M.* lives long; trees still existing in England are known to be more than 300 years old. It is propagated by seed, by suckers, by layers, or by cuttings. It succeeds best in a rich light soil.—The WHITE *M.* (*M. alba*) is a native of China, and has been there planted from time immemorial for the sake of its leaves, which are the best food for silk-worms; on which account also it has been cultivated in the south of Europe since about 1540. In North America it does not succeed further north than lat. 43°, being somewhat more impatient of frost than the Black Mulberry. The perianth and stigmas are smooth; the fruit is almost white, and is much less palatable than that of the Black *M.*, although in this respect there is great difference among the many varieties. A rob made of it is useful in sore throat. The best variety for feeding silk-worms, on account of its rapid growth and abundant leaves, is that called the PHILIPPINE MULBERRY. In India, the White *M.* is treated as a bush, and cut down twice a year; the shoots, stripped of their leaves, being thrown away, although the bark has long been used in China and Japan for making paper. It grows readily from cuttings. The root has a considerable reputation as a vermifuge.—The RED *M.* (*M. rubra*), a native of North America, abounding particularly on the lower parts of the Missouri, endures severe frosts much better than either of the preceding, and is therefore preferred for cultivation in some parts of Europe. Its fruit is deep red, and almost as pleasant as the Black Mulberry. The wood is much more valuable; being fine-grained, strong, and adapted even for ship-building. The tree attains a height of 60 feet or more.—The INDIAN *M.* (*M. Indica*) has black fruit of a delicate flavor, and the leaves are extensively used for feeding silk-worms in China, Cochinchina, and Bengal.—*M. atropurpurea* has been introduced into India from China for feeding silk-worms. *M. Mauritiana*, a native of Madagascar and Mauritius; *M. celtidifolia* and *M. corytifolia*, Peruvian species; *M. Tata-rica*, a native of Central Asia; *M. laevigata*, the species most common in the north of India; and *M. Cashmeriana*, a native of Cashmere, produce pleasant fruit. *M. dulcis*, a native of the North of India, is said to be superior in flavor to all others.

The PAPER *M.* (*Broussonetia papyrifera*) differs from the true mulberries in having the female flowers collected in a globular mass. The tree is of moderate size, or, in cultivation, a bush of 6—12 feet high; with leaves either simple or lobed, a native of India, Japan, and the islands of the Pacific Ocean, but now not uncommon in pleasure-grounds in Europe and North America. The islanders of the Pacific cultivate the Paper *M.* with great care. They make a kind of clothing from the bark, using for this purpose the bark of small branches about an inch in diameter, which they macerate in water, and then scraping off the epidermis, press and beat the moist slips together. The paper also, which is used in Japan and many parts of the East, is in great part made from the bark of the young shoots of this plant, which for this purpose is boiled to a pulp, and treated somewhat in the same way as the pulp of rags in Europe. When the shoots are cut, new ones spring up very rapidly.—Silk-worms eat the leaves of the paper mulberry.—The fruit is oblong, of a dark-scarlet color, sweetish, but insipid.

MULDER, Gerard Johanne, a distinguished living chemist, was born in 1802 at Utrecht, where his father was practising as a physician. After obtaining the degree of Doctor of Medicine at the university of his native town in 1826, he commenced the practice of his profession at Amsterdam, where he was appointed to teach botany, and subsequently chemistry, in the newly-established medical school of that city. In 1841, he was elected professor of chemistry at the university of Utrecht, in consequence of the ability he had displayed in various memoirs published in the Dutch scientific journals. He is best known to the general reader as the discoverer of Proteine (q. v.), which he maintains to be the main ingredient of albumen, fibrin, casein, &c.; but the existence of which as an independent chemical compound is at the present day not generally admitted. He is the author of numerous excellent works on physiological and agricultural chemistry, on the chemistry of wine and beer, on diet and nutrition, &c., which, in consequence of their being



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written in Dutch, are far less known in this country than they deserve. His "Chemistry of Vegetable and Animal Physiology" has been translated into English by Dr Fromberg, and his "Chemistry of Wine" by Dr Bence Jones.

**MULE** (Lat. *mulus*, supposed to be connected with Gr. *moles*, labor, and with Eng. *moil*), a hybrid animal, the offspring of the male ass and the mare, much used and valued in many parts of the world as a beast of burden. The ears are long; the head, croup, and tail resemble those of the ass rather than those of the horse; but in bulk and stature the M. approaches more nearly to the horse. The M. seems to excel both the ass and the horse in intelligence; it is remarkable for its powers of muscular endurance; and its sure-footedness particularly adapts it to mountainous countries. It has been common from very ancient times in many parts of the east; and is much used also in most of the countries around the Mediterranean Sea, and in the mountainous parts of South America. Great care is bestowed on the breeding of mules in Spain and Italy, and those of particular districts are highly esteemed. In ancient times the sons of kings rode on mules, and they were yoked in chariots. They are still used to draw the carriages of Italian cardinals and other ecclesiastical dignitaries. Both in Spain and in South America, mules employed to carry burdens are driven in troops, each preceded by an animal—in South America, usually an old mare—called the *madrina*, or god-mother, to the neck of which a little bell is attached, and the mules follow with the greatest docility. When troops mingle in their halting-places or elsewhere, they are readily separated, as they recognise at once the sound of their own bell. Mules are comparatively little used in Britain, although it is alleged that work is done at less expense by the employment of mules than by the employment of horses.

As in other hybrid animals generally, males are more numerous among mules than females; in the proportion, it is said, of two or three to one. There is no instance on record of offspring produced by two mules; but instances occur, although rarely, of their producing offspring with the horse and with the ass. The M. is very superior in size, strength, and beauty, to the hinny, the offspring of the male horse and the female ass.

**MULE. See SPINNING.**

**MÜLHAUSEN** (Fr. *Mulhouse*), a town of Germany, in the Imperial territory of Alsace-Lorraine. Pop. (1875) 53,513. M. is built on a small island between the Ill and the Rhone and Rhine Canal, and is an important station on the Strasburg and Basel line of railway. It lies in a fertile, well-watered district, and ranks as one of the most active centres of trade in Alsace; while it is also the seat of a tribunal of commerce, and of various mercantile and trade unions, which have exercised a beneficial influence on the industrial activity of the country. Its numerous manufactures produce superior woollen and fine cambric goods, excellent leather, morocco, and carpets; in addition to which, its printing and dye works for cotton, muslin, wool, and silk fabrics are almost unrivalled in regard to the delicacy of the colors and elegance of the patterns employed. M. has extensive bleaching works, and is noted for its cotton and woollen stocking manufactories, its breweries and distilleries, starch and straw works, and for its ironworks, in which locomotives and various forms of steam-engines are extensively manufactured. These manufactures, together with corn, wine, and brandy, form the staple articles of its very extensive trade.

M. early acquired commercial importance, having been erected into a free imperial city by Rudolph of Hapsburg in 1273. By siding with some of the Swiss cantons in the 14th c., it was enabled to maintain a certain degree of neutrality in the feuds between the empire and France. In 1523, M. adopted the Reformed faith. It remained a part of the circle of the Upper Rhine till 1798, when it was incorporated with France. It became a town of the German Empire after the war of 1870—1871.

**MULL**, after the Isle of Skye, the largest of the Inner Hebrides, belongs to the county of Argyle, and is washed on the w. and s. by the Atlantic, and bounded on the n. e. by the Sound of Mull. It is triangular in shape, hollowed on the west side by an inlet of the Atlantic, and is deeply indented by sea-lochs, of which the principal are Loch-na-Kel and Loch Sreidhan. Area about 237,000 statute acres, of which 12,470 are arable; pop. (1871), exclusive of the neighboring islets, 5947. Its

surface is for the most part occupied by mountains, generally rounded in outline, and rising in Ben More 3155 feet high. Of its fresh-water lakes, Loch Erisa and Loch Ba are the chief. Wood abounds in the north; but owing to the generally tame character of the mountains, the great stretches of moorland, and the absence of well-defined valleys, the scenery, with the exception of that on the coast, is uninteresting. The land under cultivation occurs chiefly on the shores and at the heads of the several lochs. The soil is unusually fertile; but the great humidity of the climate, and the frequency and violence of the gales, render it almost wholly unfit for agriculture. The land is principally laid out in stock-farms, and great numbers of cattle, sheep, and horses are reared and exported. Chief town, Tobermory (pop. 1344), in the north. The harbor of Tobermory is one of the best and safest in the Hebrides. A low-water pier was completed here in March 1854. It enables steamers to land in any state of the tide. The Sound of Mull, 20 miles long, by 2 miles in average breadth, separates the island from the mainland of Argyshire on the north-east.

MÜLLER, Friederich Max (Maximilian), one of the most eminent living orientalisists, was born at Dessau, in the duchy of Anhalt-Dessau, 6th December, 1823. His father, Wilhelm Müller, distinguished not only for his worth as a man, and his extensive and thorough scholarship, but as one of the first German lyric poets, was librarian of the ducal library, but died prematurely, October 1827. M. received the elements of his education at Dessau, and then went to Leipzig, where, under Professor Hermann Brockhaus, he began the study of Sanscrit. This he soon chose as his special pursuit; and the first fruits of his labors appeared in a translation of the "Hitopadesa" (Leip. 1844). In 1844, he went to Berlin to study under Bopp and Schelling, and consult the Sanscrit MSS. to be found there. In Paris, whither he repaired in 1845, he began, at the instigation of Burnouf, to prepare for an edition of the "Rig-Veda," with the commentary of Śāyanācārya. With this view, he came to England, June 1846, to examine the MSS. in the East India House, London, and the Bodleian Library at Oxford; and, on the recommendation of the late Professor H. H. Wilson, the East India Company commissioned him (1847) to edit the "Rig-Veda" at their expense. The first volume of this great undertaking, printed at the Oxford university press, appeared in 1849; and the sixth and concluding volume was published in 1874. In 1850, M. was appointed Deputy Taylorian Professor of Modern Languages at Oxford; in 1854, he succeeded to the professorship; and in 1858, was elected a Fellow of All Souls. While pursuing his labors connected with the "Rig-Veda," M. has published treatises on a variety of philological topics, which have done more to awaken in England a taste for the science of language in its modern sense (see GRAMMAR) than the labors of any other single scholar. Inheriting the poetic imagination and fire of his father, M. has at command such a felicity of illustration, that subjects dry under ordinary treatment, become in his hands attractive. He has published a translation into German of Kālidāsa's "Megha-dūta" (König. 1847); "The Languages of the Seat of War in the East" (2d ed. Lond. 1855); "Comparative Mythology" (in the Oxford Essays for 1856); "History of Ancient Sanscrit Literature" (2d ed. Lond. 1860); Lectures on "The Science of Language," delivered at the Royal Institution, London, in 1861; a second series, delivered in 1863. In 1863, he delivered the Rede Lecture at Cambridge, "On the Stratification of Languages;" and, in 1870, at the Royal Institution, London, a course of lectures "On the Science of Religion." "Chips from a German Workshop," in 4 vols., were published 1868-75. He is one of the 8 foreign members of the Institute of France, and has received the degree of LL.D. from Cambridge and Edinburgh.

MÜLLER, Johann, historian of Switzerland, was born 3d January, 1752, at Schaffhausen, where his father was clergyman and rector of the gymnasium. He studied at Göttingen under Heyne, Schözer, Walch, and others. In 1772 he was appointed professor of Greek at Schaffhausen, and in the same year published his first work, "Bellum Cimbricum" (Zür. 1772). Already he had commenced to devote his leisure hours to the investigation of Swiss chronicles and documents. By the advice of his friend Bonstetten, he went to Geneva in 1774, where he became a private tutor; and also (1778) delivered a series of lectures on "Universal History," afterwards published in 24 volumes. In 1781, he was called to the Collegium Carolinum at Cassel, as professor of statistics, and a little earlier published the first

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volume of his great work, "*Geschichte der Schweizer.*" In 1786, he was appointed librarian and councillor of state to the Elector of Mainz; here he finished the 3d volume of his *Swiss History*; his "*Darstellung des Fürstenbundes*" (Leip. 1787); and "*Briefe zweier Domherren*" (Frankfurt, 1797). In 1792, he went to Vienna, where the Emperor Leopold gave him a situation in the privy council, and, in 1800, appointed him first imperial librarian. In 1804, he left Vienna for Berlin, where he wrote "*Ueber die Geschichte Friedrich's I., Ueber den Untergang der Freiheit der Alten Völker,*" "*Versuch über die Zeitrechnungen der Vorwelt,*" and an additional volume of his *Swiss History*. Introduced to Napoleon after the battle of Jena, he was appointed by him (1807), having been previously dismissed from the Prussian service, secretary of state in the new kingdom of Westphalia; but died at Cassel, 29th May, 1809. M.'s "*Sämmtliche Werke*" were published, 27 vols. Stuttgart, 1810-1819; new edit. 40 vols. 1831-1835.

MÜLLER, Johann, one of the most eminent physiologists of the present century, was born at Coblenz on the 14th July 1801. He began to study with a view to orders in the Roman Catholic Church; but in 1819 he abandoned his theological studies, and devoted himself to medicine, taking, in 1822, the degree of Doctor of Medicine at Bonn. Whilst yet a student, he wrote for a prize the treatise "*De Respiratione Fœtus*" (Leip. 1823). He became, in 1824, a tutor; in 1826, an extraordinary, and in 1830, an ordinary professor of physiology and anatomy at Bonn; and in 1833, succeeded Rudolphi as professor of anatomy at Berlin. His physiological researches were most industriously prosecuted, and were rewarded by many discoveries, which obtained for him a high reputation in the scientific world. His works are numerous, and many of them occupied with particular topics in zoology and comparative anatomy. He died of apoplexy at Berlin, April 28, 1858. Among the most important are—"*Zur vergleichenden Physiologie des Gesichtsinns des Menschen und der Thiere*" (Leip. 1826); "*Grundriss der Vorlesungen über die Physiologie*" (Bonn, 1827); "*Grundriss der Vorlesungen über allgemeine Pathologie*" (Bonn, 1829); "*De Glandularum Secernentium Structura Pectentiori earumque prima Formatione in Homine atque Animalibus*" (Leip. 1830); "*Ueber die organischen Nerven der erectilen männlichen Geschlechtsorgane,*" &c. (Berlin, 1835); and "*Handbuch der Physiologie des Menschen*" (2 vols. 4th ed. Coblenz, 1851), "*Manual of the Physiology of Man,*" which has been translated into French and English. He was also the author of a large number of dissertations on a variety of subjects connected with physiology, the most important of which have been separately published. His latest investigations, on infusoria, were published in 1860. The most eminent living physiologists of Germany received their training in his school.

MÜLLER, Julius, a German theologian, was born at Brieg, on April 10, 1801, and was a brother of Charles Otfried Müller (q. v.), the antiquary. He studied at Breslau and Göttingen, at first devoting himself to law, but afterwards to theology. After much mental struggle, he adopted religious views opposed to those of the Rationalists. In 1826, he was appointed pastor at Schönburn and Rosen, near Strehlen, where he remained seven years. Having acquired a high reputation for theological learning, he was appointed in 1831 second university preacher in Göttingen, and there lectured on practical theology and pedagogics. The spirit in which he labored there may be seen from his sermons, entitled "*Das Christliche Leben, seine Kämpfe und seine Vollendung*" (The Christian Life, its Struggles and its Perfection; Bresl. 1834; 3d ed. 1847). In 1834, he became Extraordinary Professor of Theology in Göttingen, and soon after Ordinary Professor in Marburg, from which he went in 1839 to occupy a similar chair in Halle. The work on which his reputation as a theologian chiefly rests is that on Sin, "*Die Christliche Lehre von der Sünde*" (Bresl. 1839; 3d ed., revised and enlarged, 2 vols., 1849), which has been translated into English (2 vols., Edin. 1852-1853). He afterwards published pamphlets on subjects of temporary interest, particularly in vindication of the cause of Evangelical union against the attacks of the rigid Lutherans; and in 1850, he began, in conjunction with Neander and Nitzsch, a periodical, entitled "*Deutsche Zeitschrift für Christliche Wissenschaft und Christliches Leben.*" He also contributed to the "*Theol. Studien und Kritiken.*" His work "*Die Evangelische Union*" appeared in 1854.

MÜLLER, Karl Otfried, one of the most genial, richly erudite, and industrious

classical archaeologists of modern times, was born 28th August 1797, at Brieg, in Silesia. He was the son of a clergyman, and received a careful education. He studied at Breslau and Berlin. His taste for philological and archaeological studies was early developed. The first fruit of his learning was the publication of the "Ægneticonum Liber" (Berl. 1817), after which he soon received an appointment to the "Magdalenum" in Breslau, where his leisure hours were devoted to a grand attempt to analyse the whole circle of Greek myths. In 1819, he obtained an archaeological chair in Göttingen; and to thoroughly prepare himself for it, visited the collections in Germany, France, and England. His great design was to embrace the whole life of ancient Greece, its art, politics, industry, religion, in one warm and vivid conception—in a word, to cover the skeletons of antiquity with flesh, and to make the dry bones live. With this view, he lectured and wrote with a fine earnest animation, until the political troubles in Hanover made his position uncomfortable. He obtained permission to travel, and made tours in Greece and Italy, but unfortunately died of an intermittent fever at Athens, on 1st August 1840. M.'s literary and scholarly activity stretched over the whole field of Greek antiquity. We are indebted to him for many new and striking elucidations of the geography and topography, literature, grammar, mythology, manners and customs of the ancients. His work on the Dorians ("Die Dorier," translated into English by Sir George Cornwall Lewis and Henry Tufnell) forms the 2d and 3d vols. of his "Geschichte Hellen." *Stämme und Staaten* (new and improved ed. 3 vols. Bresl. 1844); his treatise "Ueber die Wohnsitze, Abstammung und ältere Geschichte des Macedon. Volks" (Berl. 1825); his "Etrusker" (2 vols. Bresl. 1828); and his maps of Greece, are works of the highest importance in the departments of ancient history and ethnology. His "Handbuch der Archæologie der Kunst" (Bresl. 1830, 3d ed. 1844; English by Leitch, London, 1850) is full of learning and of acute original observations. His "Prolegomenen zu einer wissenschaftlichen Mythologie" (Gött. 1825) led the way to a strictly historical explanation of the ancient myths. The work by which he is probably best known in England is his "History of the Literature of Ancient Greece" (Lond. 1840), undertaken at the request of the British "Society for the Diffusion of Useful Knowledge." M. died before finishing it; what he had finished was translated into English by Sir George Cornwall Lewis and Dr Donaldson, the latter of whom continued the work from where it left off—at the age of Alexander—down to the taking of Constantinople. The German original was published by M.'s brother (Bresl. 1841). He showed himself also an acute and judicious critic in his editions of Varro, "Lingua Latina," Festus, "De Significatione Verborum," &c. His contributions to periodicals, encyclopædias, &c., were likewise numerous and valuable.—MÜLLER, JULIUS, brother of the preceding, was born at Brieg, 10th April 1801, educated at Breslau, Göttingen, and Berlin, and after holding several offices, finally became a professor of theology at Halle. His best known work, "Die Christliche Lehre von der Sünde" (The Christian Doctrine of Sin; English, Edin. 1856), is considered by theological critics the most acute and profound treatise written in modern times on this mysterious subject.

MULLET (*Mugil*), a genus of acanthopterous fishes, the type of the family *Mugilidae*. In this family, the body is nearly cylindrical, the scales are large; there are two widely separated dorsal fins, the first of which has only four stiff sharp spines; the teeth are extremely fine; the gullet is closed by an extraordinary development of the pharyngeal bones, so that only soft and thin food can pass down it; a branch of the stomach forms a kind of gizzard. The best known of this family belong to the genus *Mugil*, of which there are many species. They have a small mouth, with a fold or creel in the under lip, which fits into a corresponding notch in the upper one. The Common M., or GRAY M. (*M. capito*), is found in the Mediterranean, and along the western shores of Europe, as far as the southern and south-eastern shores of England, but becomes rare further north. The Common M. is usually about fifteen inches in length, but sometimes two feet. The color is steel-gray on the back, with bluish and yellowish reflections; the belly silvery white; the flanks with six or eight longitudinal lines of rosy brown. It often ascends rivers, generally selecting soft or fat substances for food, and often seeking food by thrusting its mouth into the soft mud. It is most readily taken by a bait of the boiled entrails of fish, or cabbage boiled in broth. It is easily reared in ponds, and readily answers the call

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which usually summons it to be fed. It is highly esteemed for the table.—A very nearly allied species, also called GRAY M. (*M. cephalus*), a native of the Mediterranean, is distinguished by having the eyes half covered with an adipose membrane, and by a large triangular scale pointing backwards, just over the origin of each pectoral fin. It attains a larger size than the former species, sometimes ten or twelve pounds weight. It enters the mouths of rivers at certain seasons, and ascends into the fresh water. It is the most esteemed of all the mullets, and was in great request among the ancients. Enormous prices were given by the Romans for unusually large mullets, the price increasing, like that of diamonds, far more rapidly than the size. Mulletts are used fresh, salted, and smoke-dried. A preparation of their roe, called *Botarcha*, is in great esteem as a condiment in Italy and the south of France. Mulletts are often caught in the Mediterranean by angling from a rock, with a bait of paste, when they have been previously attracted to the spot by macaroni thrown into the water.—A third species of GRAY M. (*M. chelo*) is not unfrequent on the coasts of England, and even of Scotland. It is remarkable for its large fleshy lips. It swims in great shoals. In the Mediterranean, it sometimes attains the weight of eight pounds.—The AMERICAN M. (*M. albulus*) is very like the Common M., but more slender, the tail large and forked. It abounds about the Bahama Islands, and extends far northwards. It is highly esteemed for the table.

The name M. is also given to the genus *Mullus* of the family *Percidæ*. See **SUB-MULLET**.

**MULLET**, or **Mollet**, in Heraldry, is a charge in the form of a star, generally with five points, intended to represent a spur-rowel, and of frequent occurrence from the earliest beginnings of coat-armour. Gwillim, Sir George Mackenzie, and Nisbet lay it down that mullets should always be pierced to represent the round hole in which the spur-rowel turns, but this has been by no means uniformly attended to in practice. Much confusion exists in blazonry between mullets and stars; in England, the rule most generally adopted is, that the mullet has five points, whereas the star has six, unless any other number be specified. Nisbet lays down a canon nearly the converse of this, which has never been adhered to; and in Scottish heraldry the same figure seems to be often blazoned as a mullet or a star, according as it accompanies military or celestial figures. The mullet is the mark of cadency assigned to the third son, "to incite him to chivalry." The word mullet is occasionally used in heraldry for the fish so called.

**MULLINGA'R**, chief town of the county of Westmeath, in Ireland, is situated on the great western road from Dublin to Galway, distant from the former, with which it is connected by the Royal Canal and the Midland Western Railway, 50 miles north-west. Its population, in 1871, was 5103, of whom 4090 were Roman Catholics, 886 Protestants of the Episcopal Church, the rest members of other denominations. It is the centre of a poor-law union of 48 divisions, comprising an area of 208,401 acres. M. is a place of little historical interest, although its immunities date from the reign of Elizabeth. Its public buildings are in no way remarkable, but it possesses several schools; among the number, one recently endowed for general educational purposes. It is without manufactures, but has considerable celebrity as the site of several of the most important horse and cattle fairs in Ireland.

**MU'LLION**, the upright division between the lights of windows, screens, &c., in Gothic architecture. Mullions are rarely met with in Norman architecture, but they become more frequent in the Early English style, and in the Decorated and Perpendicular are very common. They have sometimes small shafts attached to them, which carry the tracery of the upper part of the windows. In late domestic architecture they are usually plain.

**MULLIGAN**, Col. James A., was born at Utica, New York, of Irish parents, on June 25, 1830. In 1836 his family removed to Chicago. He studied at the university of St. Mary of the Lake, of which he was the first graduate (1850), and then began to study law. He accompanied J. L. Stephens, the explorer, to the Isthmus of Panama in 1851. When he returned to Chicago, he resumed his studies and became editor of the *Western Tablet*, a weekly Catholic paper. In November, 1855, he was admitted to the bar, and in the winter of 1857 was appointed to a

clerkship in the department of the Interior at Washington, from which he retired at the outbreak of the civil war. He became colonel of the twenty-third Illinois Infantry, a fine regiment of Irishmen which he had raised in a few weeks, and in September, 1861, he left Jefferson City for Lexington, Missouri, where he took the command, and for nine days heroically defended the place against an attack by General Price with overwhelming forces. He was at last forced to capitulate on September 20, and was exchanged on November 25. On his return to Chicago he re-organized his regiment and shortly afterwards assumed the command of camp Douglas. He afterwards took part in several hard-fought engagements in Virginia and was mortally wounded at the battle of Winchester, July 26, 1864.

MULLINS, William, was born in England about the year 1575. In order to enjoy religious freedom which was not granted to the Puritans in England, he settled with his family at Leyden in Holland, and was afterwards one of the richest and most influential of those who came over in the Mayflower. It was expected that he would take an important part in the public affairs of the colony, but he died in the spring of 1621. The only one of his family who lived through that time was his daughter Priscilla, who was celebrated for her beauty and has been immortalized by Longfellow in his poem of *The Courtship of Miles Standish*. Among the many eminent Americans descended from the beautiful Priscilla may be mentioned the poet, Longfellow himself, and also Presidents John and John Quincy Adams.

MULREADY, William, R. A. was born at Ennis, in Ireland, about the year 1786. When a boy, he went to London with his parents; at the age of fifteen entered as a student in the Royal Academy, and made good progress, aiming at first at the classic style, or what, according to the notions of the day, was called high art. Following the bent of his genius, however, he soon relinquished this course, and devoted himself to the study of nature and the works of those artists who attained high reputation in a less pretentious walk of art. His first pictures were landscapes of limited dimension and subject, views in Kensington gravel-pits, old houses at Lambeth, and interior of cottages. He next essayed figure-subjects of incidents in every-day life, such as "A Roadside Inn," "Horses Baiting," "The Barber's Shop," and "Punch" (painted in 1812), "Boys Fishing" (1813), "Idle Boys" (1815). M. was elected an Associate of the Royal Academy in November 1815, and an Academician in February 1816; a strong proof of the high estimation in which his talents were held by his brethren, for the higher dignity is rarely conferred till after a probation of several years as Associate. Even in his earliest time, his works were characterized by much elaboration; but those he executed about the middle period of his career exhibit an extraordinary amount of finish and greater brilliancy of coloring, qualities that he carried further and further as he advanced in years; and though he lived to a great age (he died on July 7, 1863), he continued to work with undiminished powers till within a day of his death. A great number of M.'s best works now belong to the public, as portions of the Vernon and Sheepshanks' collections. In the first-named, there are four pictures, one of these "The Last in, or Traust Boy," exhibited in 1825, being one of the most elaborate works of his middle period; while in the Sheepshanks' collection there are no fewer than 28 of his works, among which, "First Love," exhibited in 1840, is a remarkable example of refinement in drawing, and delicacy of feeling and expression. "The Sonnet," exhibited in 1830, is perhaps his highest effort in point of style; and by "The Butt—Shooting a Cherry," exhibited in 1848, is best exemplified the remarkable minuteness of his finish and richness of his coloring. An edition of the "Vicar of Wakefield," published in 1840, by Van Voorst, embellished with 20 wood-cuts from M.'s drawings, is a very fine work. "Women Bathing" was exhibited in 1849; and, in 1852, "Blackheath Park." "The Toy Seller," a large picture exhibited the year before he died, was unfinished, and not at all equal to earlier and smaller ones, but remarkable as the work of a man whose artistic efforts had been lauded sixty years before.

MULTA'N (or Mooltan), an ancient and important city of India, in the Punjab, on a mound consisting of the ruins of ancient cities that occupied the same site, three miles from the left bank of the Chenab—the inundations of which sometimes reach M.—and 200 miles south-west of Lahore. It has railway communication with all the principal towns of India—Calcutta, Bombay, Madras, Peshawar, &c. The

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city is surrounded by a dilapidated wall, from 40 to 50 feet in height. The vicinity abounds in mosques, tombs, shrines, &c., attesting alike the antiquity and magnificence of the former cities; and the country around is remarkable for its fertility. M. is a military station, with a small redoubt in the rear of the cantonment. Its bazaars are numerous, extensive, and well stocked; and its shops, 6000 in number, are well supplied with European and Asiatic commodities. Manufactures of silks, cottons, shawls, scarfs, brocades, tissues, &c., are carried on, and there is an extensive banking trade. The merchants of M. are proverbially esteemed extremely rich. Steamers ply between this city and Hyderabad, a distance of 570 miles; and the Indus Valley Railway opens up a commercial outlet from Central Asia, the Punjab, and the North-west Provinces, to the Arabian Sea by Hyderabad and Karachi. In 1849, M. was taken by the British troops under General Whish, and annexed with its territory to the British possessions. The population of M. in 1869 was 56,826.

**MULTIPLE-POINDING** is a well-known form of action in Scotland, by which competing claims to one and the same fund are set at rest. It means double poinding or double distress, suggesting that a person who has funds in his possession is liable to be harassed by double distress; and hence he commences a suit called the action of multiple-poinding, by which he alleges that he ought not to be made to pay the sum more than once; and as he does not know who is really entitled to payment, he cites all the parties claiming it, so that they may fight out their claims among themselves. The suit corresponds to what is known in England as a bill or order of interpleader.

**MULTIPLICATION**, the third and most important of the four principal processes of arithmetic, is a compendious mode of addition, when a number is to be added to itself a given number of times. The three terms of a multiplication are the *multiplicand*, or number to be multiplied; the *multiplier*, or number by which it is to be multiplied; and the *product*, giving the amount which would be obtained if the multiplicand were added to itself the number of times denoted by the multiplier. The symbol of multiplication is  $\times$ ; and in arithmetic, the numbers are placed above each other as in addition, with a line drawn under them; in algebra, the quantities are merely placed side by side, with or without a dot between them—e. g., the multiplication of 3 by 4 may be written  $3 \times 4$ , and of  $a$  by  $b$ ,  $a \times b$ ,  $a.b$ , or  $ab$ . For multiplication of fractions, see **FRACTIONS**.

The operation of multiplication has been much abbreviated by the use of Logarithms (q. v.), and has been rendered a mere mechanical process, by the invention of Napier's Bones, the Sliding Rule, Gunter's Scale, &c.

**MULTIVALVE SHELLS**, or Multivalves, are those shelly coverings of molluscs which are formed of more than two distinct pieces. In systems of Conchology (q. v.), the term is one of primary importance; but since the study of the living animals has led to arrangements very different from those founded on their mere shells, a very subordinate place has been assigned to it, as indicating a distinction, much less important than was at first supposed. Thus, Chitons (q. v.), which have multivalve shells, are now placed in the same order of gasteropods with Limpets (q. v.), of which the shells are univalve; and *Pholas* (q. v.) and *Teredo* (q. v.), which have two principal valves and some small accessory valves, the latter also a long shelly tube, are placed among lamellibranchiate molluscs, along with most of the bivalves of conchologists. In conchological systems, barnacles and acorn-shells were also generally included, and ranked among multivalves; but these are now no longer referred even to the same division of the animal kingdom. See **CIRRHOPODA**.

**MULTURES**, in Scotch Law, mean a quantity of grain either manufactured or in kind deliverable to the proprietor or tacksman of a mill for grinding the corn sent there. Some persons living in the neighborhood are bound to send their corn to be ground at a particular mill, in which case the lands are said to be astricted to the mill, and form the thirl orucken, and the tenants or proprietors of the land are called inucken multurers. Those who are not bound to go to the mill are called out-sucken multurers. Thirlage is thus classed among servitudes, being a kind of burden on the land. Such a right is unknown in England, except sometimes in old manors.

**MUM**, a peculiar kind of beer, formerly used in this country, and still used in Germany, especially in Brunswick, where it may be almost regarded as the national drink. Instead of only malt being used, it is made of malt and wheat, to which some brewers add oats and bean-meal. It is neither so wholesome nor so agreeable as the common ale or beer.

**MUMMY.** See **EMBALMING**.

**MUMMY-WHEAT** is said to be a variety of wheat produced from grains found in an Egyptian mummy. But no good evidence of this origin has been adduced—in fact, it is as good as proved to be impossible; and the same variety has long been in general cultivation in Egypt and neighboring countries. The spike is compound—a distinguishing character, by which it is readily known, but which is not altogether permanent. It is occasionally cultivated in Britain, but seems more suitable to warmer regions.

**MUMPS**, the, is a popular name of a specific inflammation of the salivary glands described by nosologists as *Cynanche Parotidea*, or *Parotitis*. In Scotland, it is frequently termed *The Branks*.

The disorder usually begins with a feeling of stiffness about the jaws, which is followed by pains, heat, and swelling beneath the ear. The swelling begins in the parotid, but the other salivary glands (q. v.) usually soon become implicated, so that the swelling extends along the neck towards the chin, thus giving the patient a deformed and somewhat grotesque appearance. One or both sides may be affected, and, in general, the disease appears first on one side and then on the other. There is seldom much fever. The inflammation is usually at its highest point in three or four days, after which it begins to decline, suppuration of the glands scarcely ever occurring. In most cases no treatment further than antiphlogistic regimen, due attention to the bowels, and protection of the parts from cold, by the application of flannel or cotton-wool, is required, and the patient completely recovers in eight or ten days.

The disease often originates from epidemic or endemic influences, but there can be no doubt that it spreads by contagion; and, like most contagious diseases, it seldom affects the same person twice. It chiefly attacks children and young persons.

A singular circumstance connected with the disease is, that in many cases the subsidence of the swelling is immediately followed by swelling and pain in the *testes* in the male sex, and in the *mammæ* in the female. The inflammation in these glands is seldom very painful or long continued, but occasionally the inflammation is transferred from these organs to the brain, when a comparatively trifling disorder is converted into a most perilous disease.

**MÜNCHHAUSEN**, Karl Friedrich Hieronymus, Baron von, a member of an ancient and noble German family, who attained a remarkable celebrity by false and ridiculously exaggerated tales of his exploits and adventures, so that his name has become proverbial. He was born in 1720, at the family estate of Bodenwerder, in Hanover, served as a cavalry officer in the Russian campaigns against the Turks in 1737–1738, and died in 1797. A collection of his marvellous stories was first published in England under the title of "Baron Münchhausen's Narrative of his Marvellous Travels and Campaigns in Russia" (Lond. 1785). The compiler was one Rudolf Erich Raspe, an expatriated countryman of the baron's. A second edition appeared at Oxford (1786) under the title of "The Singular Travels, Campaigns, Voyages, and Sporting Adventures of Baron Munnikhouseen, commonly pronounced Munchausen; as he relates them over a bottle when surrounded by his friends." Several other editions rapidly followed. In the same year (1786) appeared the first German edition, edited by the poet Bürger; the latest—entitled "Des Freiherrn von Münchhausen, wunderbare Reisen und Abenteuer" (1849 and 1855)—is enriched by an admirable introduction by Adolf Ellisen, on the origin and sources of the famous book, and on the kind of literary fiction to which it belongs. Ellisen's father knew the splendid old braggart in his latter days, and used to visit him. Nevertheless, although Raspe may have derived many of his narratives from M. himself, he appears to have drawn pretty largely from other sources. Several of the adventures ascribed to the baron are to be found in older books, particularly in Bebel's "Faceties" (Strass. 1566); others in Castiglione's "Cortegiano," and Bildermann's "Uto-



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pin," which are included in Lange's "*Deliciae Academicæ*" (Hollbronn, 1765). M.'s stories still retain their popularity, especially with the young.

**MUNDANE EGG.** In many heathen cosmogonies, the world (Lat. *mundus*) is represented as evolved from an egg. The production of a young animal from what neither resembles it in form nor in properties, seems to have been regarded as affording a good figure of the production of a well-ordered world out of chaos. Thus, in the Egyptian, Hindu, and Japanese systems, the Creator is represented as producing an egg, from which the world was produced. The same notion is found, in variously modified forms, in the religions of many of the ruder heathen nations. Sometimes a bird is represented as depositing the egg on the primordial waters. There are other modifications of this notion or belief in the classical and other mythologies, according to which the inhabitants of the world, or some of the gods, or the powers of good and evil, are represented as produced from eggs. The egg appears also in some mythological systems as the symbol of reproduction or renovation, as well as of creation. The Mundane Egg belonged to the ancient Phœnician system, and an egg is said to have been an object of worship.

**MUNGO**, St, the popular name of St Kentigern, one of the three great missionaries of the Christian faith in Scotland. St Ninian (q. v.) converted the tribes of the south; St Columba (q. v.) was the apostle of the west and north; St Kentigern restored or established the religion of the Welsh or British people, who held the country between the Clyde on the north, and the furthest boundaries of Cumberland on the south (see *BRETTS AND SOOTS*). He is said to have been the son of a British prince, Owen ab Urien Rheged, and of a British princess, Dwyuwen or Thenaw, the daughter of Llewddyn Lueddog of Dinas Eiddyn, or Edinburgh. He was born about the year 514, it is believed at Culross, on the Forth, the site of a monastery then ruled by St Serf, of whom St Kentigern became the favorite disciple. It is said, indeed, that he was so generally beloved by the monastic brethren, that his baptismal name of Kentigern or Cyudeyrn, signifying "chief lord," was exchanged in common speech for Mungo, signifying "lovable" or "dear friend." Leaving Culross, he planted a monastery at a place then called Cathures, now known as Glasgow, and became the bishop of the kingdom of Cumbria (q. v.). The nation would seem to have been only partially converted, and the accession of a new king drove St Kentigern from the realm. He found refuge among the kindred people of Wales, and there, upon the banks of another Clyde, he founded another monastery and a bishopric, which still bears the name of his disciple, St Asaph. Recalled to Glasgow by a new king, Rydderech or Roderick the Bountiful, Kentigern renewed his missionary labors, in which he was cheered by a visit from St Columba, and dying about the year 601, was buried where the cathedral of Glasgow now stands. His life has been often written. A fragment of a memoir, composed at the desire of Herbert, Bishop of Glasgow, between 1147 and 1164, has been printed by Mr Cosmo Innes in the "*Registrum Episcopatus Glasguensis*." The longer life by Joceline of Furness, written about 1180, was published by Pinkerton in his "*Vitis Antiquæ Sauctorum Scotiæ*." It appeals to two still older lives. The fame of St Kentigern is attested by the many churches which still bear his name, as well in Scotland as in the north of England. The church of Crosthwaite, where Southey is buried, is dedicated to him. The miracles which he was believed to have wrought were so deeply rooted in the popular mind, that some of them sprung up again in the 18th c. to grace the legends of the Cameronian martyrs. Others are still commemorated by the armorial ensigns of the city of Glasgow—a hazel-tree whose frozen branches he kindled into a flame, a tame robin which he restored to life, a hand-bell which he brought from Rome, a salmon which rescued from the depths of the Clyde the lost ring of the frail queen of Cadyow. Nor is it St M. only whose memory survives at Glasgow; the parish church of "St Enoch" commemorates his mother, St Thenaw; and it is not many years since a neighboring spring, which still bears her name, ceased to be an object of occasional pilgrimage.

**MUNI**, a Sanscrit title, denoting a holy sage, and applied to a great number of distinguished personages, supposed to have acquired, by dint of austerities, more or less divine faculties.

**MUNICH**, (Ger. *München*), the capital of Bavaria, is situated in 48° 8' n. lat., and 11° 35' e. long., in the midst of a barren and flat elevated plain, at a height of

about 1700 feet above the level of the sea. Pop. (1871), 169,478, about 90 per cent. being Roman Catholics, 9 per cent. Protestants, and 1 per cent. Jews; (1876) 193,024. M. lies on the left bank of the Isar, and consists, in addition to the old town, of five suburbs, and of the three contiguous districts of Au, Haidhausen, and Obergiesing. By the efforts of King Ludwig I., who spent nearly 7,000,000 thalers on the improvements of the city, M. has been decorated with buildings of almost every style of architecture, and enriched with a larger and more valuable collection of art-treasures than any other city of Germany. It possesses 49 churches, of which all but two or three are Catholic, and of these, the most worthy of note are: the cathedral, which is the see for the archbishopric of Munich-Freising, built between 1468—1494, and remarkable for its two square towers, with their octagonal upper stories, capped by cupolas, and its 30 lofty and highly-decorated windows; the church of the Jesuits, or St Michael's, which contains a monument by Thorwaldsen to Eugene Beauharnais; the Theatiner Kirche, completed in 1767, and containing the burying-vaults of the royal family; the beautiful modern church of St Mariabühl, with its gorgeous painted glass and exquisite wood-carvings; the round church, or Basilica of St Boniface, with its dome resting on 64 monoliths of gray Tyrolean marble, and resplendent with gold, frescoes, and noble works of art; the cruciform-shaped Ludwig Kirche, embellished with Cornelius's fresco of the Last Judgment; and lastly, the Court Chapel of All Saints, a perfect casket of art-treasures. Among the other numerous public buildings, a description of which would fill a volume, we can only briefly refer to a few of the more notable; as the theatre, the largest in Germany, and capable of accommodating 2,400 spectators; the post-office; the Ruhmes-halle; the new palace, including the older royal residence, the treasury and chapel, antiquarian collections, &c.; and the Königsbau, designed by Klenze in imitation of the Pitti Palace, and built at a cost of 1,250,000 thalers, containing J. Schnorr's frescoes of the Nibelungen; the Bauquelling Halle, rich in sculpture by Schwanthaler, and in grand fresco and other paintings. In the still incomplete suburb of Maximilian are situated the old Pinakothek, or picture gallery, erected in 1836 by Klenze, containing 800,000 engravings, 9,000 drawings, a collection of Etruscan remains, &c.; and immediately opposite to it, the new Pinakothek, completed in 1853 and devoted to the works of recent artists; the Glyptothek, with its twelve galleries of ancient sculpture, and its noble collection of the works of the great modern sculptors, as Canova, Thorwaldsen, Schadow, &c. Among the gates of M., the most beautiful are the Siegesthor ("The Gate of Victory") designed after Constantine's triumphal arch in the Forum, and the Isarthor with its elaborate frescoes. In addition to these and many other buildings intended either solely for the adornment of the city, or to serve as depositories for works of art, M. possesses numerous scientific, literary, and benevolent institutions, alike remarkable for the architectural and artistic beauty of their external appearance, and the liberal spirit which characterises their internal organisation. The library, which is enriched by the biblical treasures of numerous suppressed monasteries, contains about 800,000 volumes, of which 1,300 are incunabula, with nearly 23,000 MSS. The university, with which that of Landshut was incorporated in 1826, and now known as the Ludwig-Maximilian University, comprises 6 faculties, with a staff of 116 professors and teachers. In 1876 the number of matriculated students attending the university was 1203. In association with it are numerous medical and other schools, a library containing 200,000 volumes, and various museums and cabinets. M. has an ably-conducted observatory, supplied with first-rate instruments by Fraunhofer and Reichenbach; 8 gymnasia, 4 Latin, 1 normal, various military, professional, polytechnic, and parian schools, of which the majority are Catholic; institutions for the blind, deaf and dumb, and crippled, and for female orphans, besides numerous hospitals, asylums, infant schools, &c.; an academy of sciences; royal academies of painting, sculpture, music, &c.; a botanic garden, parks, public walks, and gardens, adorned with historic, patriotic, and other monuments, and designed for the celebration of annual and other national fairs and festivals; spacious cemeteries, &c. M. is mainly indebted to Ludwig I. for its celebrity as a seat of the fine arts, as the greater number of the buildings for which it is now famed were erected between 1820 and 1860, although, under his successors, Maximilian II., and Ludwig II. (ascended the throne in 1864), the progress of the embellishments of the city has been continued on an equally liberal scale. M. is somewhat behind

many lesser towns of Germany in regard to literary advancement and freedom of speculation, while its industrial activity is also inferior to its state of high artistic development. It has, however, some eminently good iron, bronze, and bell foundries, and is famed for its lithographers and engravers, and its optical, mathematical, and mechanical instrument-makers, amongst whom Utzschneider, Fraunhofer, and Ertl have acquired a world-wide renown. M. is noted for its enormous breweries of *Bavarian beer*; and has some good manufactories for cotton, wool, and damask goods, wax-cloth, leather, paper-hangings, carriages, pianos, gold, silver, and steel wares, &c.

The present name of this city cannot be traced further than the 12th c., when Henry the Lion raised the *Villa Munichen* from its previous obscurity, by establishing a mint within its precincts, and making it the chief emporium for the salt which was obtained from Halle and the neighboring districts. In the 13th c., the dukes of the Wittelsbach dynasty selected M. for their residence, built the Ludwig-burg, some parts of whose original structure still exist, and surrounded the town with walls and other fortified defences. In 1327, the old town was nearly destroyed by fire, and rebuilt by the Emperor Ludwig of Bavaria very much on the plan which it still exhibits; but it was not till the close of last century, when the fortifications were razed to the ground, that the limits of the town were enlarged to any extent. The last fifty years indeed comprise the true history of M., since within that period all its finest buildings have been erected, its character as a focus of artistic activity has been developed, its population has been more than doubled, and its material prosperity augmented in a proportionate degree.

**MUNICIPAL ARCHITECTURE**, the style of the buildings used for municipal purposes, such as town-halls, guild-halls, &c. These were first used when the towns of the middle ages rose in importance, and asserted their freedom. Those of North Italy and Belgium were the first to move, and consequently we find in these countries the earliest and most important specimens of municipal architecture during the middle ages. It is only in the "free cities" of that epoch that town-halls are found. We therefore look for them in vain in France or England till the development of industry and knowledge had made the citizens of the large towns so wealthy and important as to enable them to raise the municipal power into an institution. When this became the case in the 15th and 16th centuries, we find in these countries abundant instances of buildings erected for the use of the guilds and corporations and the municipal courts. Many of these still exist along with the corporate bodies they belong to, especially in London, where the halls are frequently of great magnificence. Many of these corporation halls have recently been rebuilt by the wealthy bodies they belong to, such as the Fishmongers, Merchant Taylors, Grocers, and other companies. Municipal buildings on a large scale for the use of the town councils and magistrates have also been recently erected in many of our large towns, which had quite outgrown their original modest buildings; and now no town of importance is complete without a great town-hall for the use of the inhabitants.

Municipal buildings always partake of the character of the architecture of the period when they are erected; thus, we find in Italy that they are of the Italian-Gothic style in Como, Padua, Vicenza, Venice, Florence, &c., during the 13th, 14th, and 15th centuries. In Belgium, during the same period, they are of the northern Gothic style, and are almost the only really fine specimens of the civil architecture of the middle ages we possess. The Cloth-hall at Ypres, and the town-halls of Brussels, Louvain, Bruges, Oudenarde, &c., the Exchange at Antwerp, and many other markets, lodges, halls, &c., testify to the early importance of the municipal institutions in Belgium.

It is a curious fact, that in France, where the towns became of considerable importance during the middle ages, so few municipal buildings remain. This arises from the circumstance, that the resources of the early municipalities of France were devoted to aid the bishops in the erection of the great French cathedrals, and the townspeople used these cathedrals as their halls of assembly, and even for such purposes as masques and amusements.

Of the English corporation halls, those which remain are nearly all subsequent to the 14th c., from which time to the present there are very many examples. The Guild-hall of London is one of the earliest. The present building was begun in 1411,

and was built chiefly by contributions from the trades "companies" of London. Of the town-halls recently erected, those of Manchester, Liverpool, and Leeds are amongst the most important.

**MUNICIPALITY**, Municipal Corporation (from Lat. *municipes*, from *munus* and *capio*, one who enjoys the rights of a free citizen), a town or city possessed of certain privileges of local self-government; the governing body in such a town. Municipal institutions originated in the times of the Roman empire. The provincial towns of Italy, which were from the first Roman colonies, as also those which, after having an independent existence, became members of the Roman state, though subjected to the rule of an imperial governor, were allowed to enjoy a right of regulating their internal affairs. A class of the inhabitants called the *curia*, or *decuriones*, elected two officers, called *duumviri*, whose functions were supposed to be analogous to those of the consuls of the imperial city, and who exercised a limited jurisdiction, civil and criminal. There was an important functionary in every municipality called the *defensor civitatis*, or advocate for the city, the protector of the citizens against arbitrary acts on the part of the imperial governor. In the later ages of the empire, the Decurions were subject to heavy burdens, not compensated by the honor of the position, which led many to endeavor to shun the office. The municipal system declined with the decline of the empire, yet it retained vitality enough to be afterwards resuscitated in union with feudalism, and with the Saxon institutions of Britain. Some cities of Italy, France, and Germany have indeed derived their present magistracy by direct succession from the days of imperial Rome, as is notably the case with Cologne. The bishop being a shield between the conquerors and the conquered, in many cases discharged the duties or obtained the functions of the *defensor civitatis*. To the north of the Alps, under the feudal system, he became officially the civil governor of the city, as the count was of the rural district. In Southern Europe, where feudalism was less vigorous, the municipalities retained a large share of freedom and self-government.

Of the cities of the middle ages, some were entirely free; they had, like the provincial towns of Italy before the extension of the Roman conquests, a constitution independent of any other powers. Venice, Genoa, Florence, Hamburg, and Lübeck, all stood in this position. Next in dignity were the free imperial cities in Germany, which, not being comprehended in the dominions of any of the princes, were in immediate dependence on the empire. Most of these cities rose into importance in the 13th c.; and their liberties and privileges were fostered by the Franco-German emperors, to afford some counterpoise to the growing power of the immediate nobility. Nürnberg was especially celebrated for its stout resistance to the House of Brandenburg, and the successful war which it waged with the Franconian nobility. In England, the more important cities were immediate vassals of the crown; the smaller municipalities sometimes owned a subject superior, sometimes a greater municipality for their overlord.

Under the Anglo-Saxons, the English burghs were subject to the rule of an elective officer, called the "Portreeve," who exercised in burgh functions similar to those of the shire-reeve in the shire. The Norman conquerors recognized the already existing privileges of the towns by granting them charters. Instead of a shire-reeve, a viscount was placed by the king over each shire, and a bailiff instead of the former elective officer over each burgh. In the larger towns, the bailiff was allowed to assume the Norman appellation of Mayor. The municipal franchise seems to have been vested in all the resident and trading inhabitants, who shared in the payment of the local taxes, and performance of local duties. Titles to freedom were also recognised on the grounds of birth, apprenticeship, marriage, and sometimes free gift.

In all the larger towns, the trading population came to be divided into guilds or trading companies, through membership of which companies admission was obtained to the franchise. Eventually the whole community was enrolled in one or other of the guilds, each of which had its property, its by-laws, and its common hall, and the community elected the chief officers. It was on the wealthier and more influential inhabitants that municipal offices were generally conferred; and the practice gradually gained ground of these functionaries perpetuating their authority without appealing to the popular suffrage. Contentions and disputes arose regarding the right of election, and eventually the crown threw the weight of its influence into the

scale of self-elective ruling bodies. As the greater municipalities grew in strength, we find their right recognised to appear in parliament by means of representatives. The sheriffs were considered to have a discretionary power to determine which towns should, and which should not have this privilege of representation. The sovereigns of the House of Tudor and Stuart acquired the habit of extending the right of parliamentary representation to burghs not in the enjoyment of it, while at the same time, by granting or renewing to them municipal charters, they modelled the constitution of these burghs to a self-elective type, and restricted the right of voting in the choice of a representative to the governing body. During the reign of William III., Anne, and the earlier Georges, the influence of the crown was largely employed in calling new municipal corporations into existence, with the view of creating additional parliamentary support for the ministry in power. The burghs of Scotland had a history much like that of the burghs of England; their earlier charters were mere recognitions of already existing rights, and were granted to the inhabitants at large. In the course of the 14th and 15th centuries, the municipal suffrage fell gradually more and more into the hands of restricted bodies of men, until act 1469, c. 5, gave to the councils the right of appointing their successors, the old and new council together electing the officer-bearers of the corporation. This state of things continued till 1833, not without much complaint. In the Scottish burghs, the several trades possessed a much more exclusive monopoly than in England. Along with the outcry for parliamentary reform arose an outcry for municipal reform; and a separate municipal reform act putting an end to the close system was passed for each part of the empire. The English act (5 and 6 Will. IV. c. 76), entitled "An act to provide for the regulation of Municipal Corporations in England," conferred the franchise on the owners and occupiers of property within burgh, with certain qualifications as to property, residence, &c. This constituency elected the councillors, and from the body of the councillors, the mayor and aldermen were chosen. Act 32 and 33 Vict. c. 55, limited the requisite period of residence to one year's occupation, and the ballot was introduced by 35 and 36 Vict. c. 83, in municipal as in parliamentary elections. Act 3 and 4 Will. IV. made an entire change in the mode of electing councils in Scottish burghs which already had a council, and conferred councils on burghs which had none. A vote was given to every one who had resided six months in the burgh, or within seven miles of it, and possessed the requisite qualification to exercise the parliamentary franchise; a property qualification similar to what conferred the parliamentary franchise being required in burghs that did not send or contribute to send a member to parliament. The Municipal Elections Amendment Act (Scotland) 1868, has placed the municipal franchise in the hands of all registered voters to return a member of parliament, and in the case of boroughs not represented in parliament, in the hands of all persons possessing similar property qualifications: and act 33 and 34 Vict. c. 93 has provided for the establishment of a municipal register in burghs not represented in parliament. An exemption, under 3 and 4 Will. IV. c. 76, of nine small burghs from the operation of the new system has been done away with. Town-councillors must be electors residing in or carrying on business in the burgh. They remain in office three years, and elect from their own number the provost and bailies. The English act of Will. IV. abolished the exclusive privileges of the guilds, but these monopolies continued in Scotland till 1839, when they were swept away by 9 and 10 Vict. c. 17. The Irish municipal system, which had been imported ready-made from England, was assimilated to the altered English system by 3 and 4 Vict. c. 108.

**MUNIMENT-HOUSE**, a strong fire-proof apartment or building suited to contain archives, papers, and other valuables.

**MUNJEET** (*Rubia cordifolia* or *munjistia*), a species of Madder (q. v.), of which the root yields an excellent red dye. The plant differs from the common madder in its more distinctly quadrangular stem, its cordate-oblong leaves commonly in fours, and its red berries. It is a native of India, China, Japan, Central Asia, and Siberia. The root has long been used in India as affording a red dye; and is now an article of export to Europe, as a substitute for madder.

**MUNKA'CS**, a market-town of Hungary, situated on an affluent of the Theiss, 178 miles north-east of Pesth. The inhabitants are mostly artisans, and the chief production is hosiery. There are also alum manufactories, saltpetre-works, and in

the vicinity, iron-works, and mines of rock-crystal, called Hungarian diamonds. A short distance east from the town is the fortress (founded in 1359) of M., built upon an isolated height, which, although small and insignificant-looking, yet, from its strong walls and advantageous position, has, for the last few centuries, withstood many a siege. Since the beginning of the present century, it has been used as a state-prison. Pop. (1869) 8692.

MUNSTER, the largest of the four provinces of Ireland, occupies the south-west, and is bounded on the n. by Connaught, on the e. by Leinster, and on the w. and s. by the Atlantic. It contains the six counties of Clare, Cork, Kerry, Limerick, Tipperary, and Waterford, and the country is described under these heads. Area, 6,064,579 statute acres. The population of the province, which in 1841 was higher than that of any of the other provinces, was shewn to be, in 1871, 1,398,488, or 439,748 less than that of Ulster, now the most populous of the provinces.

MUNSTER, chief town of the district of the same name, as well as capital of all Westphalia, is situated in 51° 55' n. lat., and 7° 40' e. long., at the confluence of the Aa with the Münster Canal, 65 miles north-east of Düsseldorf. The population in 1871 was 34,815; in 1876, 35,535. M., which is a bishopric, and the seat of a military council, a high court of appeal, and other governmental tribunals, is one of the handsomest towns of Westphalia, retaining numerous remains of medieval architecture, whose quaint picturesque quality is enhanced by the numerous trees and shady allees, by which the squares and streets are ornamented. Among its 14 churches, of which the majority are Catholic, the most noteworthy are the cathedral, built between the 13th and 15th centuries, and despoiled of all its internal decorations by the Anabaptists; Our Lady's Church, with its noble tower; the splendid Gothic church of St Lambert, in the market-place, finished in the 13th c., on the tower of which may still be seen the three iron cages in which the bodies of the Anabaptist leaders, John of Leyden, Knipperdolling, and Krechting, were suspended, after they had suffered the most horrible martyrdom; and the church dedicated to St Ludgerus, the first bishop of M., with its singular round tower, surmounted by an octagonal lantern. The Gothic town-hall possesses historical interest in being the spot at which, in 1648, the Peace of Westphalia was signed in a large hall, which has lately been restored, and which contains portraits of all the ambassadors who were parties to the treaty. The palace, built in 1767, is surrounded by fine pleasure-grounds, including horticultural and botanical gardens, connected with the academy; and these, with the ramparts, which, since the Seven Years' War, have been converted into public walks, form a great attraction to the city. M. is well provided with institutions of charity and benevolence. The old Catholic university of M. was dismembered in 1818, and its funds apportioned to other educational establishments; and the present academy, which comprises a Catholic theological and philosophical faculty, is now the principal school. It has a library of 50,000 volumes, a natural history museum, and various collections of art and antiquity connected with it. M. has one gymnasium, a normal school for female teachers, and a number of town schools. The industrial products of M. include leather, woollen fabrics, thread, starch, and sugar, besides which there are good carriage manufactories, breweries, and distilleries. The trade is limited to the produce of the country, the principal of which are the noted Westphalian ham and sausages.

M. was known under the name of Minigardevorde in the time of Charlemagne, who, in 791, appointed it as the see of the new bishop of the Saxons, St Ludgerus. Towards the middle of the 11th c., a monastery was founded on the spot, which in course of time derived its present name from its vicinity to the minster, or monastery. In the 12th c., the bishopric was elevated into a principality of the empire. In the 13th c., the city was incorporated in the Hanseatic League; and in 1538, it declared its adhesion to the Reformed faith, notwithstanding the violent opposition of the chapter. During the years 1535 and 1536, M. was the scene of the violent politico-religious movement of the Anabaptists, when the excesses of these pretended reformers worked a violent reaction in the minds of the people, which had the effect of restoring the prestige of the episcopal power; and although the citizens occasionally made good their attempted acts of opposition to their spiritual rulers, they were finally reduced to submission under Bishop Christopher Bernhard of St Gall, who having, in 1668, built a strong citadel within the city, transferred the epis-

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copal place of residence thither from Koesfeld, where it had been established by earlier bishops. In the Seven Years' War, M. was repeatedly besieged and taken by both the belligerent parties. The bishopric of M., which since 1719 had been merged in the archbishopric of Cologne, although it retained a special form of government, was secularised in 1803, and divided among various royal houses; but subsequently shared in the common fate of other German provinces, and was for a time incorporated with France. The Congress of Vienna gave the greater part of the principality to Prussia, a small portion being apportioned to the House of Oldenburg. The Hanover acquired possession of the Münster territories of the mediatised Dukes of Arenberg.

**MUNTJAK** (*Cervus muntjac*, *Cervulus vaginalis*, or *Styllocerus muntjac*), a species of deer, abundant in Java, Sumatra, and other islands of the same region. It is about one-fifth larger than the roebuck, which it considerably resembles in form. The horns are remarkable, as there springs from the common base of each an additional horn, which is about an inch and a half in length; the principal horn, which is simple, curved, and pointed, being about five inches in length. The female has no horns. The male has large canine teeth or tusks, which also are wanting in the female.—Allied species are found in India and China.

**MÜNZER**, Thomas, one of the leaders of the Anabaptists (q. v.), was born at Stolberg, in the Harz, took his degree at Wittenberg as Master of Arts, and for some time preached the doctrines of the Reformation in Zwickau and other places. Ere long, however, he adopted mystic views, and declaimed against what he called the "servile, literal, and half" measures of the reformers, requiring a radical reformation both in church and state according to his "inward light." He proclaimed an entire community of goods, and incited the populace to plunder the houses of the wealthy. Mühlhausen fell for a time under his sway, and that of another fanatic named Pfeifer, who joined him. He took an active part in the Peasant War, and inflamed the spirits of the insurgents by the wildest speeches and songs; but they were utterly defeated on 15th May 1525, after a severe conflict, at Frankenhausen, by the Elector John and Duke George of Saxony, the Landgrave of Hesse, and the Duke of Brunswick. M. fled, but was taken and carried to Mühlhausen, where he was beheaded along with Pfeifer and a number of others. He shewed no dignity or courage in the closing scenes of his life. See Strobel's "Leben Schriften und Lehren Thom. Münzer's" (Nürnb. 1795); Seidemann's "Thom. Munzer" (Dreid. and Leipz. 1842); and Heinrich Leo in the "Evangelische Kirchenzeitung" (Berl. 1856).

**MURÆNA**, a genus of malacopterous fishes, of those to which the name Eel is commonly given, the whole of the eels being sometimes included in the family *Muraenidae*. See EEL. The true *Muraena* have no fins, except the dorsal and anal, which are low and fleshy. They have one row of sharp teeth in each jaw. The head is very large, and the jaws are moved with great power. The M. of the Romans, or MURRAY (*M. helena*), abounds in the Mediterranean, and is sometimes of large size, four feet or more in length, golden yellow in front, and purple towards the tail, beautifully banded and mottled. It is much thicker in proportion to its length than any of the fresh-water eels. Its flesh is white and highly esteemed. It prefers salt-water, but can accommodate itself to a fresh-water pond. The ancient Romans kept and fed it in vivaria. The story of Vedius Pollio feeding his murenas with offending slaves is well known. This M. has been caught on the British shores, but very rarely.

Allied to the genus M. is the genus *Sidera*, found in the Pacific.

**MURAL CROWN**, in Heraldry, a crown in the form of the top of a circular tower, masoned and embattled. It is meant to represent the crown which was given by the Romans as a mark of distinction to the soldier who first mounted the walls of a besieged town, and fixed there the standard of the army. A mural crown supporting the crest, in place of a wreath, occurs in the achievements of several of the English nobility, and in various grants of arms made in the early part of the present century to officers who had distinguished themselves in the war. Viscount Beresford, in consequence of his gallantry at the battle of Albuera, obtained as crest, issuing out of a mural crown, a dragon's head with its neck pierced through

by a broken spear, the head of the spear point downwards being held in the mouth of the dragon.

MURAT, Joachim, king of Naples, was the son of an innkeeper at La Bastide-Fortunière, near Cahors, in France, and was born there 28th March 1767 or 1768. He was at first intended for the priesthood, and actually commenced the study of theology and canon law at Toulouse, but entered the army, and being threatened with punishment for insubordination, deserted, and after spending some time at home, proceeded to Paris, where, it is said, he was for some time a waiter at a café, but soon obtained admission into the Constitutional Guard of Louis XVI. On the outbreak of the Revolution, he was made a sub-lieutenant in a cavalry regiment. His gallantry and extreme republicanism soon won him the rank of colonel. He attached himself closely to Bonaparte, under whom he served in Italy and in Egypt, signalizing himself in many battles; rose to the rank of a general of division (1799); returned with Bonaparte to France; and rendered him most important assistance on the 18th Brumaire, by dispersing the Council of Five Hundred at St Cloud. Bonaparte now intrusted him with the command of the Consular Guard, and gave him his youngest sister, Caroline, in marriage. M. commanded the cavalry at Marengo, where he greatly distinguished himself. On the establishment of the French Empire, he was loaded with honors. He continued to command the cavalry in the armies led by the Emperor, and contributed not a little to the victory at Austerlitz, and to many other victories. In 1806, the newly-erected grand duchy of Berg (q. v.) was bestowed upon him. On 1st August 1808, he was proclaimed king of the two Sicilies by the style of Joachim I. Napoleon. He took possession of Naples, but the Bourbons, through the support of Britain, retained Sicily.

M. possessed the qualities requisite for a general of cavalry rather than those of a king. He was very deficient in political skill and energy; but by the moderation of his government, he won the hearts of his subjects. Even his love of pomp and show, and the theatrical splendor of his equipment, which were a subject of mirth in France and Germany, rather gratified the Neapolitans. He endured with difficulty the yoke of Napoleon, which left him little but the outward show of royalty. In the expedition against Russia, he commanded the whole cavalry, but on its failure, he returned to Naples, anxious and discontented. He joined the French army again in 1812, but after the battle of Leipzig, withdrew to his own dominions, determined on breaking the French fetters with which he was bound. He concluded a treaty with Austria, and a truce with the British admiral, and promised the allies an auxiliary corps. He hesitated, however, even after his new course seemed to have been decisively adopted; and finding his position insecure after Napoleon's overthrow, he entered into private communications with him at Elba. On the Emperor's return to France, M. placed himself at the head of an army of 40,000 men, and commenced a hasty war against Austria. He was defeated at Ferrara, 12th April, 1815, and again at Tolentino, 2nd May. With a few horsemen he fled to Naples, where all was insurrection and commotion; thence to the island of Ischia, and found his way to France, whilst his wife and children took refuge in the British fleet. After Napoleon's final overthrow, he found refuge in Corsica, from which he proceeded in a foolhardy manner with a few followers to the coast of Naples, and proclaimed himself king and liberator, but was presently taken prisoner, and after trial by a court-martial, was shot in a hall of the castle of Fano, on 13th October 1816. See Léonard Gallais, "*Histoire de Joachim Murat*" (Paris, 1828), and Coletta, "*Histoire des Six derniers mois de la Vie de Joachim Murat*" (Paris, 1831). His widow assumed the title of Countess of Lipona, and resided in the neighborhood of Trieste, where she died in 1839. His two sons went to the United States, where the elder, NAPOLEON ACHILLE MURAT, settled in Florida, and published a number of works on the constitution and politics of his adopted country. He died 16th April, 1847. The younger, NAPOLEON LUCIEN CHARLES, married an American lady in 1837, but suffered several reverses in fortune, and Madame Murat was obliged to open a boarding-school for the support of herself and her husband. Twice he attempted to return to France secretly (in 1837 and 1844), but failed on both occasions. The Revolution of 1848, however, opened the country to him. He attached himself closely to Prince Louis Napoleon; and was in 1849 French Ambassador Extraordinary at Turin. In 1852 he was made a senator; and in 1853 he received the title of prince. The Italian revolution appeared to present



some chances for him, but nothing came of these. He was made prisoner by the Germans at Metz in 1870.

MURATORI, Ludovico Antonio, a celebrated antiquary and historian, was born at Vignola, in the duchy of Modena, October 21, 1678. From a very early period, his predilection for historical and literary pursuits began to manifest itself; and, having entered into holy orders, without, however, accepting any ecclesiastical office, his life was devoted partly to the literature of his profession, but mainly to researches in history, both sacred and profane, especially the history of his native country. In his 22d year, he was appointed one of the librarians of the Ambrosian Library at Milan, a post which has since received equal celebrity from a successor not unworthy of the fame of M., the illustrious Angelo Mai (q. v.). Here he gave to the world his first publication, a collection of unedited Greek and Latin fragments, under the titles of "*Anecdota Græca*" and "*Anecdota Latina*." But his most important labors were reserved for the capital of his native duchy, whither, in 1700, he was recalled by the Duke of Modena, to take charge of the celebrated D'Este Library, and of the ducal archives; his only ecclesiastical preferment being that of provost of the church of St Mary, at Pomposa. From the date of his return to Modena, M. began to devote himself more exclusively to Italian history, especially to the history of medieval Italy; and his labors in this department extended over the greater part of his life. It was not until the year 1733 that the first volume of his great collection, "*Rerum Italicarum Scriptores*," appeared, and the work proceeded at regular intervals for nearly thirty years, the last of the twenty-eight folio volumes which compose it bearing the date of 1761. This immense publication, which was produced by the joint contributions of the princes and higher nobility of Italy, embraces a range from the 5th to the 16th c., and contains all the chronicles of Italy during that vast period, illustrated with commentaries and critical notices. It was accompanied by a collection of dissertations illustrative of the religious, literary, social, political, military, and commercial relations of the several states of Italy during the period, in 6 vols. folio, 1738—1742, a work which, although far from being exempt from errors, is still regarded as a treasure-house of mediæval antiquities. While engaged in these prodigious labors, M. carried on an active literary correspondence with the scholars of the various countries of Europe, and contributed essays not unfrequently to the principal historical and literary academies, of most of which he was a member. He was the first, moreover, to undertake a general History of Italy from the commencement of the vulgar era down to his own time. It is in 12 vols. 4to, and still retains its value as a book of reference, having been continued by Coppi down to the year 1819. In his capacity of archivist of the Duke of Modena, he compiled, in two vols. folio, the "*Antiquities of the d'Este Family*" (1710—1740), as well as a series of historical and polemical treatises on certain territorial questions in dispute between the House of Modena and the court of Rome. To the department of classical scholarship, M.'s collection of "*Inscriptions*" (6 vols. folio, 1739—1743), which, in this point of view, was a necessary supplement to the collection of Gruter and the other antiquaries who had preceded him, is still acknowledged as a most important contribution; and he has also left works of standard merit in the departments of jurisprudence, of literary criticism, of poetry, of biography, and even of the history of medical science. In the studies of his own profession, as well liturgical and historical, as dogmatical and even ascetical, M., although he did not follow the method of the schools, was hardly less distinguished than if he had made these the pursuit of his life. Some of his opinions were regarded with disfavor, if not directly condemned; but his vindication of himself, addressed to the learned Pope Benedict XIV., drew forth a warm and honorable testimony to the uprightness of his motives, which, without approving of the opinions to which exception had been taken, declared them free from the imputation of being contrary either to the doctrine or to the discipline of the church. Although M.'s life was essentially that of a scholar, yet his exactness in discharging the duties of a parish priest was beyond all praise, and several of the existing charitable institutions of Pomposa were founded by him. He died at Modena, January 28, 1750, in his 78th year. His works, which it would be tedious to enumerate in full detail, fill 46 volumes in folio, 34 in 4to, 13 in 8vo, and many more in 12mo. Some of these are posthumous, and were published by

his nephew, G. F. Muratori, from whom we also have a life of his distinguished uncle, in 4to, printed at Omer, 1768.

MURCHISON, Sir Roderick Impey, geologist and geographer, was born at Tarncliffe, Ross-shire, in 1792. He was educated at the Grammar-school, Durham, and having a bias for military life, next studied at the Military College, Marlow. He entered the army at an early age, and served as an officer in the 36th Regiment in Spain and Portugal. He was placed on the staff of his uncle, General Sir Alexander Mackenzie, and then obtained a captaincy in the 6th Dragoon. Quitting the army in 1816, he devoted himself to science—more especially to geology. He afterwards travelled in various parts of the globe. He found the same sedimentary strata lying in the earth's crust beneath the old red sandstone in the mountainous regions of Norway and Sweden, in the vast and distant provinces of the Russian empire, and also in America. The result of his investigations was the discovery and establishment of the Silurian system, which won for him the Copley Medal of the Royal Society, and European reputation as a geologist. His subsequent exposition of the Devonian, Permian, and Laurentian systems increased and confirmed his reputation. He explored several parts of Germany, Poland, and the Carpathians; and in 1840 he commenced a geological survey of the Russian empire, under the countenance of the imperial government. M. de Vernuil was associated with him in this great work, completed in 1845. Struck with the resemblance in geological structure between the Ural Mountains and the Australian chain, M., in his anniversary address in 1844, first predicted the discovery of gold in Australia. In 1846, six years before that metal was practically worked, he addressed a letter to the President of the Royal Geological Society of Cornwall, inciting the unemployed Cornish tin-miners to emigrate and dig for gold in Australia. He was elected President of the British Association for the Advancement of Science in 1846; President of the Royal Geographical Society in 1844 and 1845; was re-elected in 1857, and continued to hold that post till 1870, when he was compelled to resign it by paralysis. His anniversary addresses to the geographers were of great interest and value. Perhaps no man of the present century has done more to promote geographical science at home, and kindle a spirit of adventure among those engaged in Arctic exploration on the one hand, and African discovery on the other. In 1855, he succeeded Sir H. De la Beche in the office of Director of the Museum of Practical Geology. He was a D.C.L. of Oxford, LL.D. of Cambridge, and a Vice-president of the Royal Society. He was knighted in 1846, made K.C.B. in 1858, and a baronet in 1863. From the Emperor of Russia he received the Grand Cross of St Anne, and also that of St Stanislaus. He died 23d October 1871. The greater portion of his contributions to science were published in the "Transactions" of the Geological and other Societies. His principal works were "The Silurian" (1836); "The Geology of Russia in Europe and the Ural Mountains," in 1845 (2d ed. 1853). He also published volumes on the "Tertiary Deposits of Lower Styria," &c. (1830), the "Geology of Cheltenham" (1834), &c.—See "Life of Sir Roderick M." by Arch. Geikie, LL.D. (1875), and obituary notice by Sir Henry Rawlinson in "Proceedings of the Royal Geographical Society," vol. xvi. No. 4.

MURCHISONIA, a genus of fossil gasteropodous mollusca belonging to the family *Heliotidae*, and so named in honor of Sir R. I. Murchison. The genus consists of at least 50 species, all which are characteristic of the Palæozoic rocks, occurring in the series from the Lower Silurian up to the Permian. The shell differs from the large genus *Pleurotomaria* only in being very much elongated. Like it, the whorls are sculptured and zoned, the aperture is channelled in front, and the outer lip is deeply notched.

MURCIA, a former province of Spain, now subdivided into the smaller provinces of Albacete and Murcia, is situated in the south-east of the peninsula. It is bounded on the n. by New Castile, on the e. by Valencia, on the s. by the Mediterranean, and on the w. by Granada, Andalusia, and New Castile. Area, 10,311 sq. m. Pop. (1870) 660,040 (of modern province, 439,067). In the n.-e., the province is partly level; but in the s.-w., it is composed of great valleys, high plateaus, and mountain ranges. The coast comprises stretches of desert. The principal river is the Segura, which flows through the middle of the province from w. to e. On the whole, M. is not very productive, and never will be, on account of the failure of water, partly caused by the

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destruction of the forests. The only fertile districts are the valleys of the Segura, and the side-valleys of Lorca, Albacete, Chinchilla, and Almansa. The Esparto wastes have remained uncultivated since the banishment of the Moriscos in 1610; and the canal of M., which is intended to irrigate the arid Campo de Cartagena, is not yet finished. M. is one of the most thinly peopled districts of Spain. The north yields wheat and barley; the south, maize, fruits, wine, oil, silk, and hemp. Goats, sheep, and swine are reared in great numbers. In metals, salt, and mineral springs, M. is abundant; it has also many smelting-works for iron, lead, and copper ore, brimstone and alum. The roads, however, are in the most wretched condition, and industry in general is still in a backward state. The province was frightfully devastated by a great earthquake, 18—21 March 1829. M. was conquered by the Arabs in 711; after the fall of the califate of Cordova, it became an independent Arab kingdom, but, six years afterwards, was subjugated by King Ferdinand III. of Castile in 1241.

MURCIA (the Roman *Murgis*), a large, important, and ancient town of Spain, capital of the province of the same name, on the left bank of the Segura, and near the junction of that river with the Saugonera, 50 miles south-west of Alicante. It stands in the midst of a beautiful and luxuriantly productive *huerta* or garden, 16 miles in length, and from 7 to 8 miles wide. This *huerta* forms a portion of what is called the vale of M.; is well watered, has a bright green appearance even in winter; produces wheat, flax, pulse, and vegetables, and grows innumerable mulberry, orange, fig, and palm trees. The streets of M. are narrow but clean, and the houses are gaudily painted in pink and yellow. Its squares are filled with cypress, orange, lemon, and other southern trees. It is the see of a bishop suffragan to Toledo; the cathedral is surmounted by a tower begun in 1532, completed 1766, and crowned by a dome from which a magnificent view is obtained. The city contains few objects of fine art, a circumstance which is accounted for by the fact that, on the occasion of its siege by Sebastian, that general, after promising that persons and property should be respected, entered the town 23d April 1610, and rifled it of its wealth and art-treasures. Silks, linens, baskets, mats, and cordage are manufactured, and oil-mills, tanneries, and other works are in operation. Pop. 80,000.

MURDER is the crime of killing a human being of malice aforethought, and is punishable with death. It is immaterial what means are employed to effect the object. Blackstone says that the name of murder, as a crime, was anciently applied only to the secret killing of another, which the word *moerda* signifies in the Teutonic language. And among the ancient Goths in Sweden and Denmark, the whole vill or neighborhood was punished for the crime, if the murderer was not discovered. Murder is defined by Coke thus: "When a person of sound memory and discretion unlawfully killeth any reasonable creature in being, and under the king's peace, with malice aforethought, either express or implied." Almost every word in this definition has been the subject of discussion in the numerous cases that have occurred in the law-courts. The murderer must be of sound memory or discretion; i. e., he must be at least 14 years of age, and not a lunatic or idiot. The act must be done unlawfully, i. e., it must not be in self-defence, or from other justifiable cause. The person killed must be a reasonable creature, and hence killing a child in the womb is not murder, but is punishable in another way (see INFANTICIDE). The essential thing in murder is that it be done maliciously and deliberately; and hence, in cases of hot blood and scuffling, the offence is generally manslaughter only. Killing by duelling is thus murder, for it is deliberate. It is not necessary, in order to constitute murder, that the murderer kill the man he intended, provided he had a deliberate design to murder some one. Thus, if one shoots at A, and misses him, but kills B, this is murder, because of the previous felonious intent, which the law transfers from one to the other. So if one lays poison for A, and B, against whom the poisoner had no felonious intent, takes it, and is killed, this is murder. Formerly, in England, the Benefit of Clergy (q. v.) was allowed in cases of murder, till it was abolished by 7 and 8 Geo. IV. c. 28. The only sentence on murderers is now death, which is carried out by hanging. Formerly, the murderer was directed after death to be hung on a gibbet in chains near the place of the crime. Formerly, also, dissection was added as part of the sentence, and the execution was to take place on the day next but one after sentence. But now an interval of a fortnight usually

takes place, and the body is buried in the precincts of the prison. Attempts to murder were until recently punishable in England like capital felony; but now attempts to murder are punishable only with penal servitude for life, or for not less than three years.

MUREX, a Linnæan genus of gasteropodous molluscs, of which has now been formed the family *Muricidæ*, belonging to the order *Pectinibranchiata* of Cuvier. The sexes are distinct; the animal has a broad foot, often much expanded; the eyes are not on stalks; the shell has a straight canal in front, often prolonged through part of a very long beak; no canal behind. The *Muricidæ* all prey on other molluscs, boring through the shells with their hard-toothed proboscis. The name ROCK-SHELL is often given to many species of *M.*; and some, from the length of the beak, are called WOODCOCK-SHELL. Some have the shell beset with long and regularly arranged spines. The whorls of the shell are marked with ridges, or *varicoses*. Some species of *M.* are found on the British coasts. Species are found in all parts of the world; the largest are tropical. The ancients obtained their purple dye (see TYRIAN PURPLE) from species of *M.*, particularly *M. trunculus* and *M. brandaris*. The VENUS COMB of the Indian seas is *M. tribulus*, a very delicate and beautiful shell, with many long thin spines. Fossil *Muricidæ* are numerous, but are scarcely found in any formation older than the eocene tertiary.

MUREXIDE, Purpurate of Ammonia, or Roman Purple, a curious coloring matter obtained from guano. It is similar to the purple dye or Tyrian purple of the ancients, which was made from a species of *Murex*—hence its name. Murexide is a product of uric acid, and as this exists in abundance, and in a very free state, in guano, that material has been found one of the best sources from which to obtain it. One process used by Mr Rumney of Manchester, the chief manufacturer of this material, to produce murexide, is to dissolve uric acid in dilute nitric acid, and after evaporating for some time at a temperature a little short of boiling, whilst still hot, to add a slight excess of ammonia. Two compounds are formed by this process, Alloxan and Alloxantin, and their mutual reaction on each other results in the formation of the beautiful minute green metallic-lustred crystals of murexide, which, in combination with some of the compounds of lead and mercury, yield most brilliant red and purple dyes. The use of murexide was becoming extensive until the discovery of the aniline colors, the greater brilliancy of which has checked its employment. Murexide is used in printing both cotton and silk goods, which, under the name of the "Roman-purple style" has been brought to great perfection by several large firms.

MURGAB, a river of Central Asia, which rises on the northern border of Afghanistan, in the Hindu Kush, immediately to the north of the sources of the Heri (q. v.). The *M.* flows westward, then north-westward, and finally northward, passing from amongst the mountains in which it has its source into the desert plains of Turkestan, where the volume of its water gradually diminishes, until it finally loses itself in a swamp in the sandy plain of Merv, after a course of about 400 miles. In the upper part of its course it receives many tributaries, but none in the lower. The most noteworthy place on its banks is Merv, or Meru (anc. *Antiochia Margiana*), a town of Independent Turkestan, about 800 miles south-east from Khiva. Merv was an important town in the days of the Seljuk dynasty, of which it was the capital, but is now very ruinous.

MURIATIC ACID. See HYDROCHLORIC ACID.

MURIDÆ, a family of rodent quadrupeds, containing many genera and a very large number of species, distributed over all parts of the world, and of which rats and mice may be regarded as typical examples. To this family belong also voles, lemmings, dormice, jerboas, marmots, &c. The *M.* are of the section of rodents having distinct clavicles. They have three or four molars on each side in each jaw, the molars at first furnished with rounded tubercles, which wear down till they exhibit mere roughened crowns. The typical *M.*, and those most nearly allied to them, have scaly tails. Marmots, dormice, jerboas, &c., have hairy tails. There are great diversities of structure and habits among the Muridæ. All of them feed on vegetable food, but many of them are ready also to eat animal substances.—The limits of the family *M.* are very differently stated by different naturalists.

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**MURILLO**, Bartholomé Estéban, was born at Seville, and baptised Jan. 1, 1618; and after receiving some education, was placed with his relative, Juan del Castillo, to study painting. Having saved a little money, which he made by painting religious pictures for exportation to South America, he went to Madrid in 1641, being then in his 24th year, was favorably noticed by his celebrated townsman, Velasquez, and through his influence, was enabled to study the *chef-d'œuvre* of Italian and Flemish art in the royal collections. In 1645, he determined to return to Seville, though advised to proceed to Rome by Velasquez, who offered him letters from the king. After settling in Seville, he received numerous important commissions, and was soon acknowledged as the head of the school there. In 1648, M. married a lady of fortune; he now maintained a handsome establishment, and his house was the resort of people of taste and fashion. The Academy of Seville was founded by him in 1660, but he filled the office of president only during the first year. He fell from a scaffold when painting in Cadiz on an altar-piece for the Church of the Capuchins, returned to Seville, and soon after died from the injury he received, April 8, 1682. In early life, he painted many pictures illustrative of humble life; in these, the manner was darker and less refined than that exhibited in his later pictures, which are mostly scriptural or religious pieces. In the Louvre, and in England, there are about forty of his works. Sir David Wilkie, who greatly admired and carefully studied the Spanish school, has remarked, in reference to it: "Velasquez and Murillo are preferred, and preferred with reason, to all the others, as the most original and characteristic of their school. These two great painters are remarkable for having lived in the same time, in the same school, painted for the same people, and of the same age, and yet to have formed two styles so different and opposite, that the most unlearned can scarcely mistake them; Murillo being all softness, while Velasquez is all sparkle and vivacity."

**MUR'RO**, an episcopal town of South Italy, in the province of Potenza, 17 miles north-west of the town of Potenza. Its castle, built on a height overlooking the ravine, was the scene of the murder of Joanna I., queen of Naples. Pop. 8333.

**MURO'M**, or Moorom, a town in the south-east of the government of Vladimir, in European Russia, 70 miles east-south-east of Vladimir, and situated on the right bank of the Oka, a tributary of the Volga. Pop. (1867) 11,236. The chief industrial establishments are tanneries and sail-cloth and linen factories. The fisheries on the Oka supply the surrounding country. M. is also noted for its orchards and kitchen-gardens, the latter of which supply a great portion of Russia with cucumber-seed of the first quality. Gypsum quarries in the neighborhood are extensively worked during winter. There is a large trade in wheat, flax, linseed, and timber. M. has a very picturesque appearance, and was formerly surrounded by impenetrable forests. It is frequently mentioned in the old national ballads, and is one of the most ancient towns of Russia.

**MURRAIN** is the generic term loosely used to designate a variety of diseases of domestic animals, but more correctly restricted to the vesicular epizootic, popularly known as the mouth and foot disease. It is a contagious eruptive fever, affecting cattle, sheep, pigs, and poultry; but rarely communicable to horses or men. It is characterised by the appearance of little bladders or vesicles in the mouth, on the lips, gums, and tongue; on the udder, and in the interdigital space; causing inability to eat, and drivelling of saliva, heat and swelling of the udder, and lameness. The disorder runs a fixed and definite course usually in eight or ten days. Good nursing, comfortable lodgings, and a liberal supply of soft, easily digestible food, are the chief requisites for speedy recovery. A laxative may be given if needed. The mouth may be washed out twice daily with a mild astringent solution, which may be made with half an ounce of alum, oxide of zinc, or sugar of lead, to the quart of water. The udder in milch cows, in which the complaint is usually most serious, should be bathed with tepid water before and after milking, which must be attended to very regularly; and the feet kept clean, and washed occasionally with the lotion used for the mouth.

**MURRAY**, or Moray, James Stewart, Earl of, sometime called the "Good Regent," was the natural son of James V. of Scotland, by Margaret, daughter of John, fourth Lord Erskine, afterwards wife of Sir Robert Douglas of Lochleven. He was born about 1581, made Commendator of the priory of St Andrews in 1588,

and subsequently of the priory of Mâcon (in France). He joined the Reformers in 1554, and almost immediately became the chief of the Protestant party in Scotland. In 1561, he was sent to France, to invite Queen Mary to return to her kingdom; and on her arrival, he became her prime minister and adviser. In February 1562, he was created Earl of Mar; but that earldom having been claimed by Lord Erskine, the title of Earl of Moray was conferred upon him instead a few months afterwards. Strongly opposed to the marriage of Mary with Lord Daruley, 29th July 1565, he endeavored to oppose it by an appeal to arms; but he was easily put to flight by the queen, and obliged to take refuge in England. He did not return to Edinburgh till the 10th March 1566, the day after the assassination of Riccio, in which he was an accomplice. In April 1567, he went to France, but was recalled in August of the same year by the lords in arms against the queen, when he found Mary a prisoner in Lochleven, and himself appointed regent of the kingdom. After the escape of the queen, he defeated her forces, May 15, 1568, at Langside, near Glasgow, and was afterwards one of the commissioners sent to England to conduct the negotiations against her. By his prompt and vigorous measures, zeal, and prudence, he succeeded in securing the peace of the kingdom, and settling the affairs of the church, but was assassinated at Linlithgow by Hamilton of Bothwellhaugh, January 21, 1570.

MURRAY, John, the name of three generations of English publishers, will for ever remain associated with the palmiest days of English literature in the 18th and 19th centuries. The founder of the house, John M'Murray, was born in Edinburgh about 1746. He obtained a commission in the Royal Marines in 1762, and in 1768 was still second-lieutenant, when, disgusted with the slowness of promotion, and panting for a more active career, he purchased the bookselling business of Mr Sandry, opposite St Dunstan's Church, London; and, dropping the Scottish prefix, became a bookseller and publisher at "32 Fleet Street." He brought out the "English Review," and published the elder Disraeli's "Curiosities of Literature," &c. He could himself wield the pen, as some pamphlets remain to testify. He died November 16, 1793, and was succeeded in due time by his son JOHN, who was left a minor of fifteen at his father's death. One of the earliest hits of John the second was Mrs Rundell's Cookery-book, which proved to be a mine of wealth—more productive, perhaps, than "Childe Harold" itself. He became connected with Thomas Campbell and Sir Walter Scott, and in 1808—1809, projected the "Quarterly Review," a Tory organ, in opposition to the Whig "Edinburgh Review," then in the height of its influence. The first number was published February 1, 1809, under the editorship of William Gifford. The new periodical was completely successful, and brought M. into communication not only with the chief literati, but also with the Conservative statesmen of the time. A still more fortunate acquaintance was that with Lord Byron, whose "Childe Harold" was published by M. in 1812. M. now removed from Fleet Street to Albemarle Street, where the business is still carried on. Here Byron and Scott first met, and here Southey made the acquaintance of Crabbe. Almost all the literary magnates of the day were "four o'clock visitors" in Albemarle Street. Byron's pleasant verse has described the scene:

"The room's so full of wits and bards,  
Crabbes, Campbells, Crokers, Freres, and Wards."

M.'s dinner-parties included politicians and statesmen, as well as authors, artists, and dilettanti. M. paid Byron nearly £20,000 for his works, and his dealings with Crabbe, Moore, Campbell and Irving, were princely. The second John M. died in his 65th year, in 1843, and was succeeded by his son, JOHN M. the third. Born in 1798, he was educated first at the Charter House, and afterwards at Edinburgh University. The age of Byron had gone by, when, in 1843, he succeeded to the business of his father and grandfather. A more practical and realistic age had succeeded, and the "Home and Colonial Library," issued to beat off foreign and American prices, was the precursor of the cheap railway and other literature of the present day. A lively and vigorous competition, arising out of the wants of a new era, has somewhat altered the relation of the great publishing houses. That of Albemarle Street no longer ranks first in the extent and variety of its transactions, but many of the greatest works in history, biography, travel, art, and science have issued from the Albemarle Street press under the régime of the third Murray. Among his later successes may be mentioned Dr Livingstone's "Travels" and "Last Journals," Smiles's "Life

of George Stephenson," and Charles Darwin's "Origin of Species by Natural Selection." His handbooks of continental travel have lately been supplemented by handbooks of English counties, and these, it is understood, owe much to the personal assistance and superintendence of the present head of the famous house of Murray.

MURRAY, Lindley, an English grammarian, was born at Swatara, Lancaster County, Pennsylvania, U.S., in 1745. He was educated at an academy of the Society of Friends, and, on his father's removal to New York, was placed in a counting house, from which he escaped to a school in New Jersey. He then studied law, and was admitted to the bar at the age of 21, and commenced a good practice. During the revolutionary war he engaged in mercantile pursuits with such success as to accumulate a handsome fortune. His health failing, he came to England and purchased the estate of Holdgate, near York, where he devoted himself to literary pursuits. In 1787, he published his "Power of Religion on the Mind," which passed through seventeen editions. His "Grammar of the English Language" was issued in 1795, and was followed by "English Exercises," the "Key," the "English Reader," "Introduction and Sequel," and a "Spelling Book." There can be no stronger indication how entirely the systematic study of the English language was—until recent years—neglected by scholars, than the fact that M.'s Grammar was for half a century the standard text-book throughout Britain and America. M. wrote an autobiography to the year 1809, which was published after his death, February 16, 1826.

MURRAY RIVER, the principal river of South Australia. See AUSTRALIA.

MURSHEDABA'D, a town of India, capital of a British district of the same name in Bengal proper, is situated on the left bank of the Bhagratī, a branch of the Ganges, about 124 m. n. of Calcutta. On the opposite side of the river stands Mahinagar, usually reckoned a part of M. The town occupies a great space, being several miles both in length and breadth, but the buildings are for the most part of mud. It contains two palaces; the one, old and gloomy; the other, constructed after the European style, and of great beauty, was completed in 1840. Situated on the most frequented route by water from Calcutta to the North-West Provinces, the trade of M. is important. Formerly, it was the capital of Bengal, and so wealthy, that Clive compared it with London. Pop. (1871) 46,184, of whom about 60 per cent. are Hindus, and 40 per cent. Mohammedans.

MURVIE'DRO, a small town of Spain, in the province of Valencia, and 18 miles north-north-east of the city of that name on the left bank of the Palancia, and two miles from its mouth. Pop. about 5000. It stands on the site of the ancient Saguntum (q. v.).

MURZU'K. See FEZZAN.

MUSACEÆ, a natural order of endogenous plants, the largest of herbaceous plants, generally destitute or almost destitute of true stems, yet resembling trees in appearance, and sometimes rivaling palms in stateliness; the long sheathing bases of the leaf-stalks combining to form a false stem. The blade of the leaf has many fine parallel veins proceeding from the midrib to the margin. The flowers are congregated on spadices, which are protected by spathe. The fruit is either a 3-valved capsule or fleshy.—The species are not numerous; they are natives of warm climates, in which they are widely distributed, and are of great value to the inhabitants of tropical countries; the fruit of some, particularly of the genus *Musa*, being much used for food, whilst the fibres of the leaves are employed for cordage and for textile purposes. See PLANTAIN, BANANA, and ARACA. A very interesting plant of the order M. is the TRAVELLER'S TREE (q. v.) of Madagascar.

MUSAUS, Johann Karl August, a German writer, born in 1737 at Jena, where he studied theology, was nominated to a country church, but prevented from entering upon the cure committed to him in consequence of the opposition of the peasantry of the parish, who refused to receive him on the ground that he had been once seen to dance. In 1763, he received the appointment of tutor to the pages at the ducal court, and in 1770 he became professor at the Weimar gymnasium. His first literary production, which appeared in 1760, was a parody of Richardson's "Sir Charles Grandison," which was at that time extravagantly admired in Germany.

The success of this satirical squib was complete; but as literary fame did not bring with it a corresponding amount of pecuniary reward, M. was compelled to gain his living by other means than writing; and an interval of more than eighteen years elapsed before he found leisure to reappear as an author. In 1778, he published his "*Physiognomischen Reisen*," in which he endeavored, by good natured yet striking satire, to counteract the absurd uses to which the Germans of his day had turned Lavater's system. This, like his previous work, was pre-eminently successful, and encouraged by the marks of popular favor with which it was received, he laid aside his incognito, and continued to devote himself to authorship. In 1782, appeared his charming version of German folk-lore, under the title of "*Volksmärchen der Deutschen*," which professed to be merely a collection of popular tales noted down from the lips of illiterate old country people; but these tales were tinged with such a blending of genial humor, quaint fancy, and strong sense, that they have become a classical work of their kind, popular among persons of every age and class. His satirical sketches, entitled "*Freund Heins Erscheinungen in Holbein's Manier*," (Winterthur, 1785), maintained his reputation as one of the sprightliest and most genial satirists of his country. Under the name of Schellenberg, he began a course of tales, "*Straussfedern*" (Berl. 1787), which, however, he did not live to complete. He died in 1787. His "*Moralische Kinderklapper*" appeared the year after his death, while his other posthumous writings were edited in 1791, with an interesting notice of the author, by his relative and pupil, A. V. Kotzebue. M.'s style was at once correct and elegant, adapting itself with singular flexibility to the various subjects which he handled; while the unaffected geniality and frank loving nature which are reflected in all he wrote, have deservedly made him one of the most popular writers of his day in Germany.

MUSÆUS, one of the ancient Greek poets of the mythic period, is said to have been the son of Eumolpus and Selene; according to others, the son and pupil of Orpheus. To him was ascribed the introduction of the Eleusinian and other mysteries into Greece, and the ordering of many religious rites. He was among the ancients also the reputed author of a number of poems, oracles, purificatory verses, a war of the Titans, a theogony, hymns, &c.; but of the few verses which remain the authenticity is very doubtful.—A later MUSÆUS, who probably flourished about the end of the sixth c. of the Christian era, was the author of a very pleasing amatory poem, in Greek, entitled "*Hero and Leander*," discovered in the 13th c., of which the first edition was published by Aldus Manutius about 1494, and of which there have been many subsequent editions.

MUSCÆ VOLITANTES is the term applied to ocular spectra, which appear like flies on the wing, or floating black spots before the eyes. There are two kinds of muscæ volitantes—the one a perfectly harmless kind, while the other is symptomatic of one of the most serious diseases of the eyes, viz., amaurosis.

Whoever will look through a minute pin-hole in a card at the clear sky may see floating before his sight a number of translucent tubes or fibres, and many little beads, of which some are separate, some attached to the tubes, and some apparently within them. Some of the tubes or fibres are straight, others looped or twisted, and others again forked. All these objects are bright in the middle, and bounded by fine black lines, beyond and parallel to which may be seen an appearance of colored lines or fringes. The doublings and crossings of the loops or knots in the twisted fibres appear as black points. Though the eye be fixed, these bodies change their position with greater or less rapidity. Now, in ordinary light and vision all these objects are imperceptible, unless the knots or fibres happen to be larger than usual, when they constitute the harmless kind of muscæ volitantes. The black lines and fringes are phenomena of the inflexion or diffraction (q. v.) of light, which are never seen except in divergent rays, and all muscæ volitantes having such fringes must be situated at a greater or less distance from the retina; and there are conclusive reasons for believing that they occupy the vitreous humor, and cannot therefore portend amaurosis; whereas those black spots which have no fringes, and which do not move, or which move only with the motions of the eye, are points in the retina which are insensible to light, and are therefore to be regarded as symptomatic of danger to vision. To decide, then, whether the muscæ volitantes are or are not indicative of danger, the patient should fix his eye on a white surface (as a sheet of



Muscardine  
Musco

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letter-paper) after a sudden shake of the head; if they sink gently downwards, they are innocent. It should perhaps be added, that though they seem to descend, they must in reality be ascending; floating up in the vitreous humor as far as the cellular partitions formed by the hyaloid membrane will permit. See *ERY*. For further information on the differences between the innocent and the dangerous forms of *musca volitantes*, the reader is referred to an article by Sir David Brewster in the "North British Review" for November 1856.

MU'SCARDINE, or Silk-worm Rot (*Botrytis Bassiana*), a fungus (see *BOTRYTIS*) which grows on silk-worms, and often kills them in great numbers. It consists of erect branching threads, with clusters of spores at the end of short lateral branches. The spores of this fungus germinate even on healthful silk-worms, and in circumstances otherwise most favorable to their healthfulness. They germinate also on the caterpillars of other lepidopterous insects. When this pest appears among silk-worms, its progress cannot be checked by any means known. For prevention, it is most important that the silk-worms be not overcrowded.

MUSCAT, or Maskât, an independent Arab state, forming the sea-coast of Omân, in Eastern Arabia. It extends from the Strait of Ormus to the Island of Mosclrah, and nowhere exceeds 150 miles in width. The coast and interior are both sterile, but the country is studded with very fertile oases. The capital is Muscat (population, 60,000), on the Persian Gulf, a fortified town, surrounded with gardens and date-palms. It has a very good harbor, which, in the winter months, is reckoned the best refuge in the Indian Ocean, and is a most important centre of trade, where the productions of Europe, of Africa, and of the East are exchanged. The principal exports are Arabian coffee and pearls obtained from the Persian Gulf; but wheat, dates, raisins, salt, sulphur, drugs, and horses are also exported. The independence of Omân dates from 761, when the people elected a sovereign of their own. For 900 years the Imams were elected for personal merit, and afterwards from members of personal merit, and afterwards from members of a ruling family. M. was taken by Albuquerque in 1507, and remained in the hands of the Portuguese till 1643, when the Arabs recovered possession of it. The Imams afterwards made extensive conquests in Eastern Africa, including Zanzibar, Mombas, Quiloa, &c. In 1793, they acquired possession of the coasts of Laristan and Mogistan, the islands of El Kishim and Ormus, and the town of Bender Abbas in Persia, paying to the Shah a rent or tribute of 6000 tomanas. The state was very prosperous under the wise and mild sway of Said Seid, the late Imam. He ascended the throne in 1803, at the age of 16, and reigned till his death in 1856. He was long a faithful ally of England. In 1834, the Imams were driven from their Persian dependencies, which in their opinion belonged to them in perpetuity so long as they paid the rental. They recaptured Bender Abbas, but in consequence of English interference, they were compelled to conclude a treaty with Persia in April 1856. This is said to have broken the heart of the old Seid, who died on 19th Oct., 1856. He appointed his son Majid to succeed him in Zanzibar, and his son Thuwani to succeed him in Muscat. The latter was murdered by his son Salim in 1863, who reigned for a short time, but was driven out by his uncle, Sayed Tuky. In consequence of the unsettled state of affairs in M., Persia has assumed the government of Bender Abbas and the Persian coast territory. See ZANZIBAR and WAHABIS.—See "History of the Imams and Seyids of Omân," by Sahib-ibn-Razik, from the Arabic, by Rev G. P. Badger (1871); Markham's "History of Persia" (1874).

MUSCATEL (Ital. *moscodo*, musk), the name given to many kinds of sweet and strong French and Italian wines, whether white or red. Amongst the finest are the white Rivesalt and red Bagnol wines from Roussillon, and the Lunel from the Pyrenees, the Lacrymæ Christi and Carigliano of Naples, &c.

MUSCATINE, a city of Iowa, U. S., is on the west bank of the Mississippi, 100 miles above Keokuk, and 82 south-east of Iowa city. It has a large trade by the river, and several railroads, three steam flour-mills, planing-machines, four large saw-mills, which annually produce about 80,000,000 feet of timber, besides shingles, &c. There are 14 churches, schools, newspapers, &c. Pop. (1880) 8,223.

MUSCHELKALK (Ger. shell-lime), the middle member of the Triassic, or New Red Sandstone period, the beds of which are entirely absent from the British strata.

Being typically developed in Germany, the foreign name has been universally adopted to designate them. They consist of (1st) a series of compact, grayish, regularly-bedded limestone, more than 300 feet thick; and (2d) alternations of limestone, dolomite, marl, gypsum, and rock-salt, nearly 300 feet thick. The limestone abounds in the remains of Mollusca. The palæozoic Goniatites are replaced by the Ceratites, a remarkable link between them and the Secondary Ammonites. Ceratites are distinguished by the few small denticulations of the inner lobes of the suture. The heads and stems of Lily encrinurites (*Eucrinus*) are also abundant in these strata, and the remains of ganoid fish have also been met with.

MUSCUL. See Mosasa.

MUSCICAPIDÆ, a family of birds of the order *Insectores* and tribe *Dentirostres*, of which the greater number receive the popular name Fly-catcher (q. v.). The limits of the family are, however, very variously defined by different ornithologists. The *M.* are mostly inhabitants of the warmer parts of the world, in which they are very widely diffused. The species are very numerous.

MUSCIDÆ, a family of dipterous insects, having a short, thick membranous proboscis, geniculated at the base, entirely retractile so as to be concealed within the mouth, and terminated by two large lobes (see HOUSE-FLY); the antennæ three-jointed; the thorax with a transverse suture. The species are very numerous, and universally distributed. More than 800 are found in Britain, among which are the well-known House-fly, Blow-fly, &c. The larvæ are Maggots (q. v.). Although some of the *M.* are troublesome, none of them are so much so as species of some other allied families.

MUSCLE AND MUSCULAR TISSUE. Muscular tissue is specially distinguished by its contractile power, and is the instrument by which all the sensible movements of the animal body are performed. When examined under a high magnifying power, the fibres of which it is composed are found to exist under two forms, which can be distinguished from one another by the presence or absence of very close and minute transverse bars or stripes. The fibres of the *voluntary* muscles—or those whose movements can be influenced by the will—as well as the fibres of the heart, are *striped*; while those of the *involuntary* muscles—the muscular structures over which we have no control—as, for example, the muscular fibres of the intestinal canal, the uterus, and the bladder, are *unstriped*.

On examining an ordinary voluntary muscle with the naked eye (a muscle from one of the extremities of any animal, for example), we observe that it presents a fibrous appearance, and that the fibres are arranged with great regularity in the direction in which the muscle is to act or contract (for it is by their inherent power of contracting that muscles act). On closer examination, it is found that these fibres are arranged in *fasciculi*, or bundles of various sizes, enclosed in sheaths of areolar tissue, by which they are at the same time connected with and isolated from those adjoining them; and when the smallest *fasciculus*, visible to the naked eye, is examined with the microscope, it is seen to consist of a number of cylindrical fibres lying in a parallel direction, and closely bound together. These *primitive* (or, as some writers term them, the *ultimate*) fibres present two sets of markings or *striae*—viz., a longitudinal and a transverse set. The fibres, when separated from each other, frequently split longitudinally into *fibrille*. Sometimes, however, when a fibre is extended, it separates in the direction of the transverse striae into a series of discs. Either cleavage is equally natural, but the latter is the least common. Hence, observes Mr Bowman, who has specially investigated the minute structure of the voluntary muscle, "it is as proper to say that the fibre is a pile of discs as that it is a bundle of fibrille; but, in fact, it is neither the one nor the other, but a mass in whose structure there is an intimation of the existence of both, and a tendency to cleave in the two directions. If there were a general disintegration along all the lines in both directions, there would result a series of particles, which may be termed *primitive particles* or *sarcous elements*, the union of which constitutes the mass of the fibre. These elementary particles are arranged and united together in the two directions, and the resulting discs, as well as fibrille, are equal to one another in size, and contain an equal number of particles. The same particles compose both. To detach an entire fibrilla is to abstract a particle of every disc, and *vice versa*." The fibres are supplied with vessels and nerves which lie in the intervals between them,

and are attached by their extremities through the medium of tendon or aponeurosis to the parts which they are intended to move. Aggregated in parallel series, of greater or lesser size, and associated with nerves, vessels, tendinous structures, &c., they form the various MUSCLES, which are for the most part solid and elongated, but are sometimes expanded (as in the diaphragm) into a membranous shape. The length of the fibres is usually about that of the muscle in which they may occur, and may vary from two feet or more (in the sartorius muscle) to less than two lines (in the stapedius muscle in the middle ear); while their width varies from 1-60th to 1-1500th of an inch, being largest in crustaceans, fishes, and reptiles, where their irritability, or property of contracting under the action of a stimulus, is most enduring, and smallest in birds, where it is most evanescent. Their average width in man is about 1-400th of an inch, being about 1-352d of an inch in the male and 1-454th of an inch in the female. The average distance between the striæ, or the size of the sarcolem elements, in the human subject is 1-9400th of an inch, the extremes being 1-15000th and 1-6000th of an inch, according to the contraction or relaxation of the fibre. The form of the fibres is polygonal, their sides being flattened against those of the adjoining fibres. Each fibre is enclosed in a transparent, very delicate, but tough and elastic tubular sheath, which cannot always be readily seen, but is distinctly shewn stretching between the separated fragments of a fibre which has been broken within it, for its toughness will often resist a force before which its brittle contents give way. This tubular sheath is known as the *sarcolemma* or *myolemma*—the former term being derived from the Greek words *sarx*, flesh, and *lemma*, a skiu or husk; and the latter, from the Greek words *mûs*, a muscle, and *lemma*.

It was for a long time believed that the contraction of a muscle was associated with a change in the direction of each fibre from a straight line to a sinuous or zig-zag course. The investigations of Mr Bowman have, however, shewn that this view is erroneous. He has proved that in a state of contraction there is an approximation of the transverse striæ, and a general shortening with a simultaneous thickening of the fibre, but that it is never thrown out of the straight line, except when it has ceased to contract, and its extremities are acted on by the contraction of adjacent fibres.

Muscles grow by an increase, not of the number, but of the bulk of their elementary fibres; and Mr Bowman believes "that the number of fibres remains through life as it was in the fœtus, and that the spare or muscular build of the individual is determined by the mould in which his body was originally cast."

The structure of the *involuntary* or *unstriated* muscles must now be considered. This form of muscular tissue most commonly occurs in the shape of flattened bands of considerable length, but of a width not exceeding 1-2000th or 1-3000th of an inch. These bands are translucent, and sometimes slightly granular, and are usually marked at intervals by elongated nuclei, which become much more apparent on the addition of acetic acid. Kölliker has shewn that every one of these bands or fibres is either a single elongated cell (a fibre-cell) or is a fasciculus of such cells. These fibres have not usually fixed points of attachment like the striated fibres, but form continuous investments around cavities within the body—such as the intestinal canal, the bladder, the uterus, the blood-vessels, &c.—or are dispersed through the substance of tissues, such as the skin, to which they impart a contractile property.

The chemical composition of ordinary (or voluntary) muscle is described in the article FLESH. It is only necessary to add that the fibrillæ, or the sarcolem elements of which they are composed, consist of a substance termed SYNTONINE (q. v.), which closely resembles the fibrine or coagulating constituent of the blood; and that the same syntonine is also the main constituent of the unstriated muscles, or at all events of their fibre-cells. Like the blood-fibrine, it exists in a fluid form in the living tissue, and only coagulates or solidifies after death.

Our limited space prevents even an allusion to the arrangement and distribution of blood-vessels, nerves, and areolar-tissues in muscular structures; and we therefore pass on to the consideration of the muscles and their functions.

Muscles vary extremely in their form. In the limbs they are usually of considerable length, surrounding the bones and forming an important protection to the joints; while in the trunk, they are flattened and broad, and contribute very essentially to form the walls of the cavities which they enclose. There is unfortunately

no definite rule regarding the nomenclature of muscles. Muscles derive their names (1) from their situation—as the temporal, pectorals, glutæals, &c.; or (2) from their direction—as the rectus, obliquus, &c., of which there may be several pairs—as, for example, rectus femoris, rectus abdominalis, rectus capitis, &c.; or (3) from their uses—as the masseter, the various flexors, extensors; or (4) from their shape—as the deltoid, trapezina, rhomboid, &c.; or (5) from the number of their divisions—as the biceps and triceps; or (6) from their points of attachment—as the sterno-cleido-mastoid, the genio-hyo-glossus, the sterno-thyroid, &c. In the description of a muscle we express its points of attachment by the words *origin* and *insertion*; the former being applied to the more fixed point or that towards which the motion is directed, while the latter is applied to the more movable point. The application of these terms is, however, in many cases arbitrary, as many muscles pull equally towards both attachments. Muscles opposed in action are termed *antagonists*, this antagonism being in most cases required by the necessity that exists for an active moving power in opposite directions. Thus, by one set of muscles, the *flexors*, the limbs are bent; while by a contrary set, the *extensors*, they are straightened. One set, termed the muscles of mastication, closes the jaws, while another set opens them; and probably every muscle in the body has its antagonists in one or more other muscles.

The skeleton, which may be termed the locomotive framework, may be regarded as a series of levers, of which the fulcrum is, for the most part, in a joint—viz., at one extremity of a bone—the resistance (or weight) at the further end, and the force (or muscle) in the intermediate portion. In most cases, in order to preserve the necessary form of the body, muscles are applied at a great mechanical disadvantage as regards the exercise of their power; that is to say, a much larger force is employed than would suffice, if differently applied, to overcome the resistance. The two main sources of this disadvantage lie in the obliquity of the insertion, and consequently of the action of most muscles, and in the muscles being usually inserted very near the fulcrum. The first of these disadvantages is in many cases diminished by the enlargements of the bones at the joints. The tendons of the muscles situated above the joint are usually inserted immediately below the bony enlargement, and thus reach the bone that is to be moved in a direction somewhat approaching the perpendicular. If this enlargement did not exist, the contraction of the muscle, instead of causing the lower bone to turn upon the upper one with comparatively little loss of power, would do little more than cause the two ends of the bones to press upon each other. The second mechanical disadvantage is compensated for by gain in the extent and velocity of movement, and by the avoidance of the great inconvenience of having the muscles extended in straight lines between the ends of jointed continuous levers. Thus the bones of the forearm are bent upon the bone of the arm by the biceps muscle which arises close to the head of the latter, and is inserted at a short distance from the elbow-joint, which acts as the fulcrum of the lever. By this arrangement, a contraction of a single inch in the muscle moves the hand, in the same time, through the extent of about 12 inches, but then the hand moves through every inch with only about the twelfth part of the power exerted by the muscle. By the junction of two or more levers in one direction, as in the different segments of the extremities, the extent and velocity of their united actions are communicated to the extreme one. Thus a blow of the fist may be made to include the force of all the muscles engaged in extending the shoulder, elbow, and wrist.

The great and characteristic property of muscular tissue—that of shortening itself in a particular direction when stimulated—is called *contractility*. The stimulus may be direct irritation by mechanical means, or by galvanism, or by some chemical substance, but in the living body the muscular fibres are, in most cases, made to contract by the immediate influence of the nerves distributed among them, which are consequently termed *motor nerves* (see NERVOUS SYSTEM), and are under the influence of the will. By an exertion of volition, we can contract more or fewer muscles at once, and to any degree, within certain limits; and as a matter of fact, there is hardly any ordinary movement performed in which several muscles are not called in play. But every voluntary muscle is also subject to other influences more powerful in their operation than the will. The movement of the features under the impulses of passion and emotion are more or less involuntary,

as is shewn by the very partial power the will has of restraining them, and the extreme difficulty of imitating them.

Many movements ensue involuntarily when certain impressions, which need not necessarily be attended with consciousness, are made on the surface of the body, or on any part of its interior, either by external or internal causes. Such movements are termed *reflex*, and are noticed in the article NERVOUS SYSTEM. Our space precludes us from noticing the individual groups of muscles in the human body. Several important groups are, however, noticed under ARM, EYE, FOOT, HAND, LEG, &c.

**MUSCULAR FORCE**, Origin of. The recent and decisive investigation of Professor Fick and Wislicenus\* of Zurich, of Professor Frankland and of Professor Parkes, have completely overthrown the physiological views on this subject held previous to the year 1866. While the inference from previous experiments was, that the effect of exercise was to cause a very large increase in the elimination of carbon, and a much smaller, but very perceptible increase in the elimination of nitrogen, Fick and Wislicenus (from observations made on the excretion of nitrogen during the ascent of the Faulhorn) deny altogether the increase of the nitrogen, and come to the conclusion, that the force generated in the muscles is the result of the burning (oxidation) of non-nitrogenous substances (fats or carbohydrates), and not of the burning of the albuminous constituents of muscular tissue; and they conclude, that the nitrogenous constituents of muscles are rather to be regarded as forming the machine in which these fats or carbohydrates are burned, than as the subjects which are burned. Dr Frankland ("Philosophical Magazine," September 1866) arrives at the conclusion that the non-nitrogenous constituents of the food, such as starch, fat, &c., are the chief sources of the actual energy which becomes partially transformed into muscular work. He does not, however, deny to the albuminous matter a co-operation in the production of muscular power, but he regards their chief use as being to renew the muscular tissue. The muscles are thus the source both of animal heat and of muscular force. One of the latest investigators of this important subject is Professor Parkes, who communicated the result of his inquiries to the Royal Society (see "Proceedings of the Royal Society," Nos. 89 and 94, 1867). Two series of experiments were made on soldiers at Netley. Two men were kept on ordinary diet and on usual work for four days; were then kept in perfect rest for two days, on a diet free from nitrogen; then finally returned for four days more to their usual food and work. In the second series, the same course was adopted, except that throughout the whole period the men took a constant quantity (30½ grains) of nitrogen daily.

The conclusions deduced by Dr Parkes from these experiments were, that Professors Fick and Wislicenus are quite correct in stating that there is no increase of nitrogen eliminated during the period of exercise. There is, on the contrary, a slight decrease. They are not correct in stating that there is no increase after exercise, for there is a perceptible, though not a very large increase. "Without going into an analysis of the experiments, which would occupy too much space, I believe," says Dr Parkes in his Sanitary Report contained in the last volume of the Army Statistical, Sanitary, and Medical Report, 1867, p. 346, "my results indicate that our ideas of the origin of muscular force and of nutrition generally, must be modified; that during action, muscles appropriate nitrogen, and grow; and that they do not give it off and waste, as was formerly supposed, or undergo no change, as Fick and Wislicenus believe. In other words, formation of nitrogenous tissues goes on during action, and removal of nitrogen goes on during rest. The mechanical force manifested during muscular action is, however, probably derived from changes in the carbohydrates, especially the fats, which changes are connected with the appropriation of nitrogen by the muscles."

The theory of muscular action which he proposes for consideration is this. During action, the muscles appropriate nitrogen; this act is accompanied by changes in the carbohydrates, which lead to the manifestation of mechanical force; these changes lead to effete products (lactic acid, &c.) in the muscles, which, as appears from Ranke's experiments, stop their contraction. Then ensues an action of oxy-

\*A translation of their Memoir may be found in the "Philosophical Magazine" for June 1866 (supplementary number).

gen upon the nitrogenous framework of the muscle, and a removal of the effeto products of the carbo-hydrates, so that the muscle becomes again capable of appropriating nitrogen, and of acting. The amount of truth in this theory must be decided by the investigations of others; it seems the only one which can explain the facts, if these have been correctly made out.

Although it is mainly to the above-named physiologists that we owe our recently acquired knowledge, it deserves mention that previous investigations undertaken on different but allied subjects by other physiological chemists, as, for example, Dr Edward Smith, Lawes and Gilbert, Playfair, and Haughton, are entirely in accordance with our views.

MUSES, in the Classic Mythology, divinities originally included amongst the Nymphs, but afterwards regarded as quite distinct from them. To them was ascribed the power of inspiring song, and poets and musicians were therefore regarded as their pupils and favorites. They were at first honored amongst the Thracians, and as Pieria around Olympus was the original seat of that people, it came to be considered as the native country of the Muses, who were therefore called *Pierides*. In the earliest period their number was three, though Homer sometimes speaks of a single muse, and once, at least, alludes to nine. This last is the number given by Hesiod in his "Theogony," who also mentions their names—Clio (q. v.), Euterpe (q. v.), Thalia (q. v.), Melpomene (q. v.), Terpsichore (q. v.), Erato, Polyhymnia (q. v.), Urania (q. v.), and Calliope (q. v.). Their origin is differently given, but the most widely-spread account represented them as the daughters of Zeus and Mnemosyne. Homer speaks of them as the goddesses of song, and as dwelling on the summit of Olympus. They are also often represented as the companions of Apollo, and as singing while played upon the lyre at the banquets of the Immortals. Various legends ascribed to them victories in musical competitions, particularly over the Sirens (q. v.). In the later classic times, particular provinces were assigned to them in connection with different departments of literature, science, and the fine arts; but the invocations addressed to them appear to have been, as in the case of modern writers, merely formal imitations of the early poets. Their worship amongst the Romans was a mere imitation of the Greeks, and never became truly national or popular. Among the places sacred to them were the wells of Aganippe and Hippocrene on Mount Helicon, and the Castalian spring on Mount Parnassus.

MUSEUM (Gr. *mouseton*), originally the name given by the ancients to a temple of the Muses, and afterwards to a building devoted to science, learning, and the fine arts. The first museum of this kind was the celebrated Alexandrian Museum (see ACADEMY). After the revival of learning in Europe, the term museum was sometimes applied to the apartment in which any kind of philosophical apparatus was kept and used; but it has long been almost exclusively appropriated to collections of the monuments of antiquity and of other things interesting to the scholar and man of science. In this sense it began to be first used in Italy, and probably in the case of the famous Florentine Museum, founded by Cosmo de Medici, which soon became a great and most valuable collection of antiquities. Nothing analogous to the museums of modern times existed amongst the ancients, the greatest collections of statues and paintings which were made in the houses of wealthy Romans having been intended for splendor rather than for the promotion of art. The name soon ceased to be limited to collections of antiquities, and sculptures, and paintings; collections illustrative of natural history and other sciences now form a chief part of the treasures of many of the greatest museums, and there are museums devoted to particular branches of science. Of the museums of Britain, the British Museum (q. v.) is the greatest; that of Oxford, founded in 1679, is the oldest.—The museum of the Vatican, in Rome, contains immense treasures in sculptures and paintings, and also in books and manuscripts.—The museum of the Louvre in Paris, that of St Petersburg, and those of Dresden, Vienna, Munich, and Berlin, are amongst the greatest in the world. The usefulness of a museum depends not merely upon the amount of its treasures, but, perhaps, even in a greater degree upon their proper arrangement; and whilst great collections in the chief capitals of the world are of incalculable importance to science, its interests are also likely to be much promoted by those local museums, still unhappily not numerous, which are devoted to the illustration of all that belongs to particular and limited districts. Museums appropriated to the illustration of the industrial arts—their raw material, their machines,

Mushroom  
Mus.c

340

and their products—and of everything economically valuable, are of recent origin, but their importance is unquestionably very great. Pre-eminent among institutions of this kind in Britain are the South Kensington Museum in London, and the Museum of Science and Art in Edinburgh.

MU'SHROOM, or Agaric (*Agaricus*), a genus of fungi, of the suborder *Hymenomyces*, having a *hymenium* of unequal plates or gills on the lower side of the *pileus*. The species are very numerous. Many of them are poisonous, many are edible, and some are among the most esteemed fungi. The species most esteemed in Britain is the Common M. (*A. campestris*), a native also of most of the temperate regions both of the northern and of the southern hemisphere, and of which a very large and fine variety occurs in Eastern Australia. It is found during summer and autumn (but chiefly in autumn) in pastures, orchards, vineyards, &c. Its *pileus* is regularly convex, becoming almost flat when old; fleshy, dry, white with a tinge of yellow or brown; of a silky smoothness on the upper surface, or somewhat scaly, but never warty; thickly set on the under side with very unequal gills, which in a young state are pink, and afterwards become dark brown. The *pileus* is attached by its centre to the top of the stem. The stem is of a firm fleshy texture, and towards the top is surrounded by a more or less distinct white membranous ring, the remains of the curtain or veil (*inductum*), which in a young state extends to the *pileus*, and covers the gills. This M. is gathered for the table when young, being preferred when the veil is still unbroken, and the unexpanded *pileus* has the form of a ball or button; but both in this state, and afterwards, whilst it shews no symptoms of decay, it is used for making Ketchup (q. v.). It has a very pleasant smell and taste, and the flesh, when bruised, assumes a reddish-brown color.—Very similar to it, and often sold instead of it in London and elsewhere, but rejected by all skillful housekeepers as unfit even for making ketchup, is the St GEORGE'S AGARIC (*A. Georgii*), sometimes called *whitecaps*, frequent in moist pastures and near buildings in all parts of Britain. This species is easily distinguished by its larger size—the *pileus* being sometimes 18 inches broad—its coarser appearance, its rather disagreeable smell, the yellow color which its flesh assumes when bruised, and the lighter color of its gills.—Care must be taken not to confound the Common M. with the white variety of *Agaricus phalloides*, a species not uncommon in Britain, chiefly in woods and on the borders of woods, which is very poisonous. Perhaps it is the possibility of this mistake which has led to the prohibition of the Common M. in Rome, where many kinds of excellent fungi are brought in great abundance to the market, and where a special officer superintends the sale of them. *A. phalloides* is, however, easily distinguished by the ring at the bottom of the stem, the white color of the gills, the warts on the upper surface of the *pileus*, and the powerful smell, which becomes extremely disagreeable as the M. grows old.—Another species of M. much in use for the table is the FAIRY-RING M. (*A. oreades*), sometimes called *Scotch Bonnets*—the *Champignon* of the French. It is common in pastures in Britain and most parts of Europe, often forming Fairy Rings (q. v.). It is much smaller than the Common M., the *pileus* being seldom more than an inch broad, the stem taller in proportion. The stem is solid, fibrous, and tough, with no ring; the *pileus* smooth, fleshy, tough, convex, with a more or less distinct boss (*umbo*) in the centre, of a watery-brown color, the flesh white. The odor is strong, but agreeable. This M. is used for ketchup, and is also dried and powdered for use at table as a savory addition to sauces and stews. It is constantly brought to market in England. It is liable, however, to be confounded with several poisonous species; but only one of them, *A. dealbatus*, forms fairy rings, and this may be readily distinguished by its disagreeable odor, by its becoming grayish-brown in zones when soaked in water, by the margin of the *pileus* being at first rolled inwards, and by its very fine dingy whitish gills.—The other edible species of M. or agaric are numerous, but they are chiefly used on the continent of Europe, and scarcely at all in Britain, although some of them are common British plants.—The ORANGE-MILKED AGARIC (*A. deliciosus*), which grows chiefly in fir-woods and among junipers, has a viscid *pileus*, four inches or more broad, at first orange, afterwards pale, the gills and juice orange, the gills running down the stem, the smell and taste agreeable.—The MORELLOON (*A. prunellus*) is common in woods and pastures, particularly on sandy soils. It has a *pileus* about 2–4 inches broad, convex, yellowish-white when young, the gills

at first white, and afterwards flesh-colored. The odor is agreeable. It is much esteemed on the continent as an article of food.—The *PARASOL AGARIC* (*A. procerus*) is found in pastures, especially under trees. It loves sandy soils. It is remarkable for its long stem, 8–12 inches high, with a thick spongy ring. The pileus is 3–7 inches broad, at first obtusely conic, then bell-shaped, covered with brown scales. The taste and smell are pleasant.—The *WHITE FIELD AGARIC* (*A. virgineus*) is one of the most common of British species, growing in pastures, with viscid or satiny white or whitish convex pileus, fully an inch broad, stem nearly two inches long, and light chocolate-colored distant gills, which run down the stem. It grows either singly or in groups.—The *ANISE M.*, or *SWEET-SCENTED AGARIC* (*A. odorus*), grows in shady woods and dells among moss and decaying leaves. It has a slightly convex pileus, about three inches broad, with pale gills. The odor is like that of anise.—The *IVORY M.* (*A. eburneus*) is found in woods, with pileus 2–3 inches broad, of a grayish-yellow color, broad gills, and a rather long and somewhat scaly stem.—The *SMOXY M.* (*A. fumosus*), with pileus smoke-gray above, the gills and stalk yellowish, is common in fir-woods.—All these are edible, and more or less pleasant and nutritious. Finer than most of them is the *IMPERIAL M.* (*A. cæsaricus*), the *Kaiserling* of the Germans, a species found in loamy soils in some parts of Europe, with orange pileus and lighter yellow stem and gills; but, unhappily, it is apt to be confounded with the very poisonous *Amanita* (q. v.) *muscaria*.

The *COMMON M.* is frequently cultivated both in the open garden and in houses or sheds. To grow it in the open garden, beds are prepared, generally of earth mixed with horse-dung, partly fresh and partly from old hotbeds, and are raised into ridges almost as high as broad. To grow it in houses, boxes are filled with alternate layers of half-rotten horse-dung and of straw, with a surface layer of fine mould. But of each of these methods there are many different modifications, none of which can here be detailed. In both, the production of mushrooms is sometimes left to the chance—often almost of a certainty—of spawn (*mycelium*) or spores existing in the dung or earth; sometimes, to increase the probability of a speedy and abundant crop, earth is introduced into the bed or box from a pasture known to be rich in mushrooms, and *M. spawn* is also frequently planted, which is either collected where mushrooms grow, or produced by artificial means, often appearing and being propagated extensively without the development of the *M. itself*. The almost certain production of *M. spawn* in heaps of slightly-fermenting horse-dung, straw, and earth, has been often urged as an argument in favor of the equivocal generation of fungi, but the minuteness and multitude of the spores may more reasonably be urged on the opposite side.

**MUSIC** (Gr. *mousiké*, from *mousa*, muse; Lat. *musica*), a combination or succession of sounds having the property of *pitch*, so arranged as to please the ear. The pleasure derived from music arises from its exciting agreeable sensations, and raising pleasing mental images and emotions. Apart from words, it expresses passion and sentiment, and linked to words, it loses its vagueness, and becomes a beautiful illustration of language.

The doctrine of musical sounds is based on the principles of *Acoustics* (q. v.). Sound is conveyed through elastic media by waves, not of alternate elevation and depression, but of alternate condensation and rarefaction, in which it is the form, the condition of the groups of particles that progresses, not each individual particle. When a series of vibrations recur on the ear at precisely equal intervals of time, following each other so closely that each cannot be separately distinguished, the result is a musical sound or note. The sound ceases to have a musical character when each pulsation is individually audible, as is the case when there are fewer than about sixteen beats in a second. The gravity or sharpness of the sound is called its *pitch*, and depends on the number of vibrations in a given time. A succession or progression of musical sounds following each other constitutes *melody*; the difference in pitch between any two of them is called an *interval*. Where two or more musical sounds, whose relative pitch is properly proportioned, are heard simultaneously, the result is a *chord*, and a succession of chords constitutes *harmony*.

When a vibration is communicated to a string stretched between two points, the result is a musical note, whose pitch is dependent on the length of the string and the degree of tension applied to it; the shorter the string, and the greater the tension, the higher is the pitch. If the string be divided in the middle, the tension re-



maintaining the same, the note produced is twice as high in pitch, and is called the octave to the note produced by the whole string. Every vibration of the one corresponds to two of the other, and there is between a note and its octave a far closer relation than between any two other notes; they go together almost as one sound, and are considered to a great extent as one musical sound. In the diatonic scale, familiar to every correct ear, there are six notes, bearing certain harmonic relations to the fundamental note, interposed between it and its octave; and as we ascend, the notes arrange themselves in similar successions of sevens, each set an octave higher, or double the pitch of that which preceded it. The seven notes are designated by the names of the first seven letters of the alphabet, the same letter being used for any note and its octave. For another notation also in use, see *SOLMISATION*. Taking C for the fundamental note, we have for our scale

C D E F G A B C D E F G A B C, &c.

The scale may be extended up or down indefinitely, so long as the sounds obtained continue to be musical. The satisfaction and sense of completeness which the diatonic scale gives the ear, arise from its being founded on correct harmonic principles. The quality called harmony is produced by a coincidence of vibrations: notes are more harmonious the oftener their waves coincide. Besides the octave, two of whose waves coincide with one of the fundamental, there are other intervals harmonious, though in a less degree. Dividing our string into three parts instead of two, we have a note higher than the octave, which may be lowered by an octave by making the string two-thirds of the original length, and produces a wave of which three coincide with two of the fundamental. Next to the octave, this note stands in the most intimate relation to the fundamental; it is called the dominant. Dividing the string by five, and lowering the note two octaves, another harmonic is got, called the mediant. In contradistinction from both these, the fundamental note (or any of its octaves) is called the tonic or key-note. C being taken as the key-note, E is the mediant, and G the dominant. These three notes, when struck simultaneously, form the harmonic triad, and stand to each other in the relation of 1, 5-4, 3-2 (numbers indicating the number of vibrations, which are inversely as the length of the string) or, reducing fractions to integers, in the relation of 4, 5, 6. When a musical string is vibrating, these sounds are heard on close observation more or less distinctly vibrating along with it, the cause being a spontaneous division of the string into aliquot parts, producing subordinate vibrations simultaneously with the principal vibrations. But the dominant may in its turn be the tonic from which another triad of tonic, mediant, and dominant is taken, forming a scale of triads extending indefinitely up and down, and it is from three such adjacent triads that the diatonic scale originates. Its elements are the triad of the tonic united with the triads which stand in the most intimate relation to it—viz., those immediately above and below it—

F A C, C E G, G B D.

F is the note whose dominant is C (the tonic), and therefore, in respect of C, it is called the subdominant. A is the mediant of the subdominant F, and therefore called the submediant. D is the dominant of the dominant, and is called the super-tonic. B, the mediant of the dominant, is called the leading note. We have seen that the notes of each triad stand to each other in the relation of 4, 5, 6. Preserving this proportion, and multiplying to avoid fractions, we have

F A C E G B D  
as 16, 20, 24, 30, 36, 45, 54

We must multiply F and A by 2, and divide D by 2, to bring them within the compass of an octave, and then we have

C D E F G A B C  
as 24, 27, 30, 32, 36, 40, 45, 48

These are the degrees of the Diatonic Scale, which are indicated by the white keys of the pianoforte, as in the following figure.

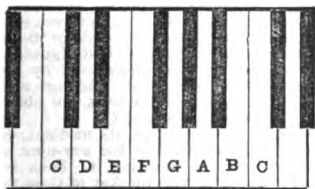
The interval CD is commonly called a second; CE, a third; CF, a fourth; CG, a fifth; CA, a sixth; and CB, a seventh; CC being, as already seen, an eighth or octave—names corresponding to the position of the notes on the key board or in the

diatonic scale, but having no relation to the proper proportional numbers already given. The intervals of the third, fifth, and sixth (counting from the key-note), owing to the more intimate harmonic relation of the notes between which they lie, afford more satisfaction to the ear than the others, or are, as it is called, the most perfectly consonant intervals. Intervals may be counted from any note as well as the tonic. *DE* is called a third as well as *CE*, although these intervals are unequal. We may have intervals beyond the octave: they are, however, substantially but repetitions of those below, *CD*, a ninth, being also, a second, and so on.

It is often desirable in the course of a musical composition to change the key-note, which involves the formation of a diatonic scale on some other note than *C*, in which case we are said to modulate from one key into another. As the intervals *CD*, *DE*, *EF*, &c., are by no means all equal, the notes which we have already got will not do for a scale founded on any other tonic than *C*. The ratios of the intervals in the diatonic scale, expressed in numbers by logarithms, are:

<i>C</i>	<i>D</i>	<i>E</i>	<i>F</i>	<i>G</i>	<i>A</i>	<i>B</i>	<i>C</i>
51	46	28	51	46	51	28	

At first sight it would appear that in keyed instruments there must be a separate row of keys for each tonic, but practically this is found not to be necessary. If *D* instead of *C* be taken as key-note, *E*, *G*, and *A* are some approach to the correct second, fourth, and fifth, but *F* and *C* are greatly too low in pitch for a proper third and seventh. With some notes taken as key-note, the correspondence is greater, with others it is less. The difficulty is overcome by a system of compromises called Temperament (q. v.). Roughly speaking, we have in the diatonic scale an alternation of two long intervals, a short interval, three long intervals, and a short interval. The long intervals 51 and 46 are styled tones, and the short interval 28 a semitone. Were the tones all equal, and the semitone exactly half a tone, a note interposed in the middle of each tone, dividing the seven intervals into twelve, would make it immaterial where the scale began. A system founded on this supposition is the remedy actually adopted in most keyed instruments, and the inaccuracy produced by this compromise is not sufficiently great to offend the ear.



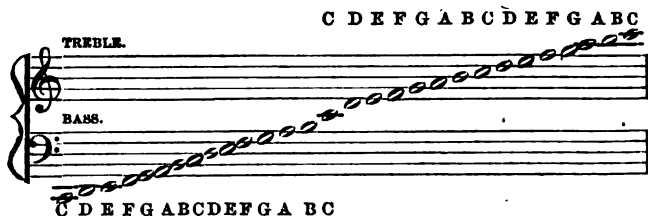
The interposed notes indicated by the black keys of the pianoforte (see fig.), complete what is called the chromatic scale, consisting of twelve intervals approximately equal.



The notes of music are represented in ordinary notation on a series of five parallel lines, called the staff. On these lines, and in the four spaces between them, marks are placed indicating the notes, which are counted upwards, beginning with

the lowest line. Every line or space is called a degree, the staff consisting of nine degrees.

When more than nine notes are required, the spaces below and above the staff are used, and the scale is extended by means of short added lines, called *leger lines*. The pitch of the notes on the scale is determined by a figure called a clef, (*clavis*, a key), placed at the beginning of the staff on a particular note, from which all the others are counted. The clefs most in use are the bass, tenor, and treble clefs, represented on the notes F, C, and G respectively (see *CLEF*). The treble and bass clefs only are used in music for keyed instruments, and when a staff is required for each hand, they are joined together by a brace, the upper staff for the right hand, the lower for the left. The ascending scale in these clefs is as follows:

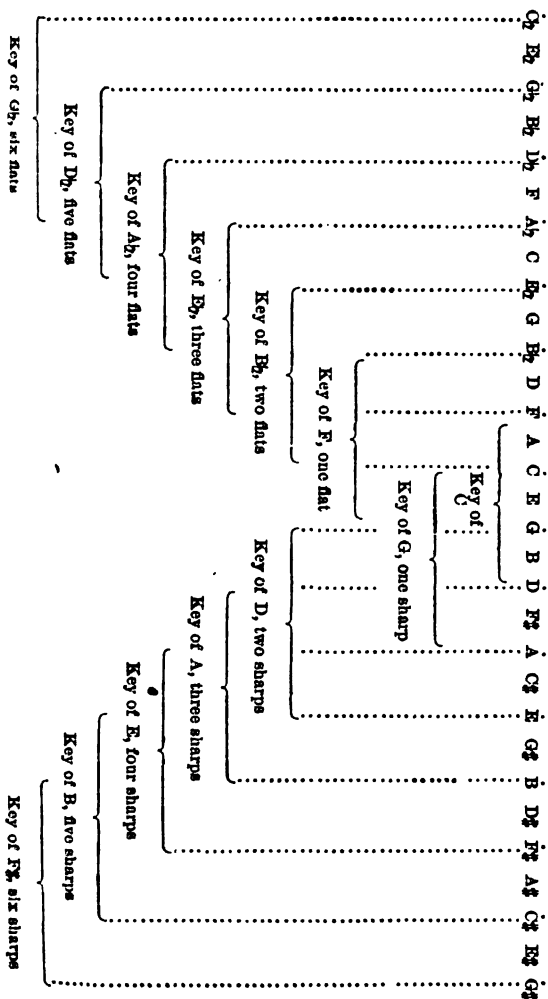


These notes correspond with the white keys of the pianoforte or the diatonic scale when C is key-note, no allowance being made for the black keys, which, as we have seen, divide the tones into semitones. Those semitones which do not occur with C as key-note are represented by the signs  $\sharp$  (sharp) and  $\flat$  (flat). The sign  $\sharp$ , prefixed to a note, elevates it a semitone in the scale, raising, for example, F to F sharp.  $\flat$  lowers the note by a semitone, depressing B to B flat. When a note which has been elevated by a sharp, or depressed by a flat, is to be restored to its original place, the character  $\natural$  (natural) is prefixed to it.

The names of the intervals correspond to the degrees of the staff, but it has been seen that intervals of the same name are not necessarily equal. If the sign of a flat or a sharp be prefixed to either note of an interval, it still preserves its name of a third, a fifth, &c.; but to distinguish intervals of the same degree, the qualifying epithets of major and minor, augmented and diminished, are used.

The different keys in music are best understood by reverting to the scale of triads, on which the diatonic scale is founded. Taking a series of triads, of which the dominant of each is the key-note of the next, we obtain the following scale, extended both upwards and downwards from C:

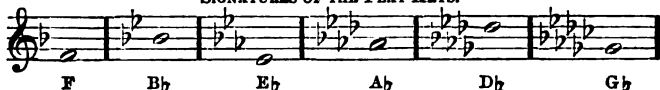
Each triad is composed of the key-note, its mediant, and dominant, and the scale of each key is composed of the triad of the key-note, with the triad immediately preceding and that immediately following it. Each key is succeeded by the key of its dominant, and if we begin with the key of C (in the middle of the scale), each key acquires an additional sharp till we reach the key of F $\sharp$  with six sharps. These are the sharp keys. If, beginning again with the key of C, we go back instead of forward in the scale of triads, we obtain the flat keys; each key has an additional flat to that above it, till we come down to the key of C $\flat$  with six flats. This key in instruments with temperament is exactly the same with that of F $\sharp$ , and on this account it is not generally found convenient to extend the keys beyond six, or at most seven, sharps or flats. G $\sharp$  with seven sharps is the same as D $\flat$  with five flats, and C $\flat$  with seven flats is the same as B with five sharps. In music written in these keys, double sharps and double flats occur, which are indicated by the characters  $\times$  and  $\flat\flat$  respectively. In writing music in any key with sharps or flats, it is usual, instead of prefixing the sharp or flat to each note when required, to place the sharps and flats belonging to the key together after the clef, on the degree to which they belong, and such collections of sharps or flats are called the signature.



## SIGNATURES OF THE SHARP KEYS.



## SIGNATURES OF THE FLAT KEYS.



A sharp or flat introduced in a composition which does not appear in the signature, is prefixed to the note, and called an accidental.

The diatonic scale and keys above described belong to what is called the major mode; there is also another mode in use called the minor mode. In the minor, as in the major mode, the diatonic scale and the keys are based on the scale of triads. Each of the triads already considered consists of two unequal intervals, called a major third and minor third. Supposing we begin with the minor instead of the major third, we have a succession of chords taking their minor third from one triad and their major third from another. These compound cords are called minor triads. Their proportion is as 10, 12, 15, and out of three such consecutive minor triads the scale of the minor mode is constructed.

D̂ F̂ Â Ĉ Ê Ĝ B̂  
80, 96, 120, 144, 160, 216, 270

Multiplying D and F by 2, and dividing B by 2, to bring the whole within the compass of an octave, we have:

A B C D E F G A  
120, 135, 144, 160, 180, 192, 216, 240.

The scale here represented is what is known as the descending scale of the minor mode. When the seventh of the scale ascends to the eighth, it becomes a sharp, as the proper leading note or sharp seventh to the tonic. This sharp is, however, always omitted from the signature, and placed accidentally before the seventh which it is to elevate. In order to avoid the harsh interval of the augmented second (from F to G#), it is usual in the ascending scale to make the sixth sharp also, in order to accommodate the seventh; thus the ascending or accidental scale of the minor mode has two notes altered from the signature.



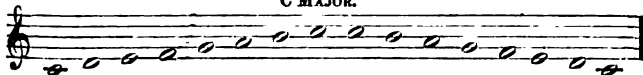
Each minor scale is called the relative minor to the major scale on its right hand in the scale of triads, with which it has the same signature: thus the relative minor scale to C major is that of A minor.

C major      F̂ Â Ĉ Ê Ĝ B̂  
A minor      D̂ F̂ Â Ĉ Ê Ĝ B̂

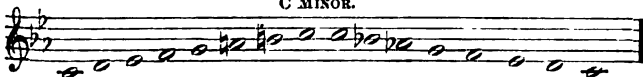
Each minor scale is also called the tonic minor to the major scale on the same key note, from which it differs in flattening the third of its tonic, and in the descending

scale also the third of its subdominant and dominant. The tonic minor scale to C major is C minor.

C MAJOR.



C MINOR.



As the descending scale regulates the signature, each tonic minor has three flats more, or three sharps less in its signature than its tonic major.

F MAJOR.

F MINOR.



A MAJOR.

A MINOR.



G MAJOR.

G MINOR.



In this last example, F#, B#, and E# are all considered sharps in contrast with F, B, and E of the minor scale.

**Rhythm.**—In musical notation, the relative duration of notes is indicated by their form. Notes may be open or close; they may consist of a head only, or of a head and stem. Where there is a stem, it may be turned up or down, according to convenience. The semibreve, the longest note in ordinary music, is open, and consists of a head only (♩). The minim is an open note with a stem, half the length of a semibreve (♩); the crotchet is a close note with a stem, half the length of a minim (♩); the quaver is a close note with a stem and hook, half the length of a crotchet (♩); a quaver is further divided into two semiquavers with two hooks (♩);

four demi-semiquavers with three hooks (♩); and eight semi-demi-semiquavers with

four hooks (♩). In slow religious music, an open square note, called a breve (♩),

sometimes occurs. The semibreve is equivalent in time to two minims, four crotchets, eight quavers, sixteen semiquavers, thirty-two demi-semiquavers, and sixty-four semi-demi-semiquavers. The notes formed with hooks may be grouped


together




. In vocal music this is not done except

when a group is to be sung to one syllable. When a dot is placed after a note  $\text{P} \cdot$  it is lengthened by one-half; when two dots,  $\text{P} \cdot \cdot$  it is lengthened by three-fourths.

Every piece of music is divided into portions equal in time, called measures, which are separated from each other by vertical lines called bars. The term bar is often loosely used to denote the measure as well as the line. The exact length of the measure is indicated by a sign at the beginning of the movement. In common

time, indicated by the sign  each measure includes a semibreve, or its equivalent




made up in notes of lower value:  All

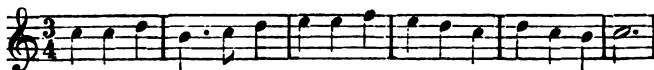
other measures of time have for their signatures two figures placed as a fraction, one over the other. The figures of the denominator are either 2, 4, 8, or 16, which stand for minims, crotchets, quavers, and semiquavers respectively (i. e., halves, fourths, &c. of a semibreve); the numerator indicates the number of these fractional parts of a semibreve contained in each measure. There is another form of common time besides that already noticed, which is called half-time, has a minim or

two crotchets in the measure, and is known by the signature  i. e., two



crotchets— 

When there are three minims, crotchets, or quivers in a measure, the piece is said to

be in triple time, its signature being   or .



When two or more measures of triple time are united in one measure, the movement is said to be in compound common time. Its usual forms are indicated by

the signatures  and . In the first, there are three submeasures of three

crotchets; in the second, two submeasures of three quavers—



Compound triple time occurs where there are nine notes in a measure, either crotchets, quavers, or semiquavers, grouped in three. Its signatures are—



A variety occasionally occurs in simple or triple time

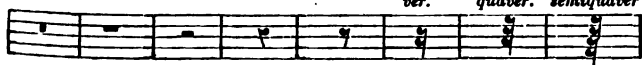
by the measure note being divided into three, or even five or seven, instead of two parts, which are grouped together, sometimes with the figure 3, 5, or 7, placed




The object of the division of musical passages into measures is to indicate their rhythm, a quality forming an essential element in the pleasure derived from music. Notes of music, like words or syllables, are accented or unaccented. The principal accent is given to the first note of a measure. Of the four measure notes in common time, the third has also a subordinate accent, as has the third measure note in triple time. There are occasions when a strong accent, or emphasis as it is called, is laid on the part of the measure which is usually unaccented; this the composer indicates by the Italian terms *rinforzando*, *sforzato*, abbreviated *rinf.*, *sf.*

When in the course of a movement silence is required for a time, this is indicated by a rest or rests corresponding to that time; the breve, semibreve, minim, &c., have each their respective rests, which are represented as follows:—

Breve. Semibreve. Minim. Crotchet. Quaver. Semiquaver. Demi-semi. Semi-demi  
ver. quaver. semiquaver



A rest may, like a note, be dotted to indicate the addition of half to its length.

The double bar  consists of two strong vertical lines placed at the end of

a musical composition, and also at other parts (not necessarily coincident with the end of a measure) where a strain or rhetorical division of a movement terminates. When dotted on one side, all the measures on the side with the dots are to be repeated from the beginning, or from the antecedent double bar.

A tie is an arch placed between two notes on the same degree, to indicate that instead of the two notes written, one note is to be played of the length of both. When the last note of one measure is thus connected with the first of the next measure, the former, though naturally the unaccented note, acquires the emphasis—



When the same arch is drawn over two or more notes not in the same degree, it is



called a slur, and merely indicates that they are to be played smoothly or fluently



When notes are to be played short, distinct, and detached (*staccato*), a dot is placed over them. A dash implies a greater, and the union of dot and slur a less degree of *staccato*—



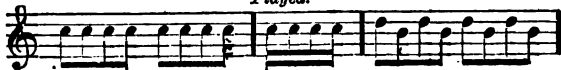
The pause  $\frown$  placed over a note indicates a delay in the time of the movement, and a continuance of the sound made on that part of the measure.

The various degrees of softness and loudness which occur in a piece of music are indicated by the letter *f* for *forte*, loud; *p* for *piano*, soft, also *pp* for *piu-sissimo*, very soft; *mf* for *mezzo forte*, rather loud, and *ff* for *fortissimo*, very loud. A gradual increase of loudness is denoted by the word *crescendo*, or the sign  $<$ ; and a diminution from loud to soft by the word *diminuendo*, or the contrary sign  $>$ . Many other expressions are used in the body of written music, indicating slowness, quickness, and the character of execution. The most important of them are explained under separate articles—as are the various musical graces or embellishments known under the names of the *Appogiatura*, *Beat*, *Shake*, and *Turn*. Among abbreviations in frequent use are a line drawn over or under a semibreve, or through the stem of a minim or crotchet, to divide it into quavers; or a double line, to divide it into semiquavers. Two minims may be connected to indicate their repetition as quavers. Thus—

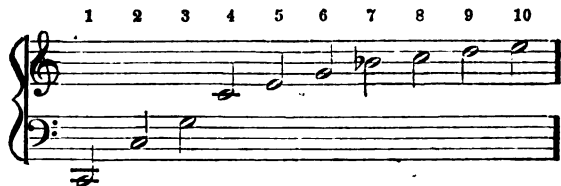
Written.



Played.



**Harmony.**—We have mentioned that when a string is struck, its harmonics are more or less distinctly heard along with it. This arises from the string sponta-



neously dividing itself into aliquot parts—as one-half, one-third, one-fourth, one-fifth, one-sixth, one-seventh, &c., of the string. The numbers 2, 3, 4, 5, 6, 7, expres-

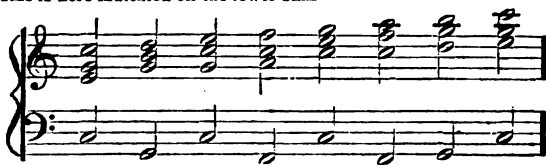
sing the relative number of vibrations in a given time, are a measure of the pitch of the note, and placed proportionally to one another, or in the form of a fraction, they are a measure of the interval. The prime numbers 2, 3, 5, and 7, and their compounds, constitute the harmonics of a musical sound; no division by a higher prime number is tolerable to the ear along with the fundamental note, and no sound corresponding to such division is audible in the vibrations of a string.

The degrees of the harmonic scale consist of intervals decreasing in a geometrical ratio from the octave to the minor tone, viz.—



1 : 2 Octave.	6 : 7 Grave third.
2 : 3 Fifth.	7 : 8 Tone maximus.
3 : 4 Fourth.	8 : 9 Tone major.
4 : 5 Major third.	9 : 10 Tone minor.
5 : 6 Minor third.	

Other intervals more or less consonant are to be found in the harmonic scale, of which the most important is 4 : 7, the grave seventh. From this scale is derived the triad, which we have seen to be the foundation of the diatonic scale, and also the whole theory of chords.

The first five notes of the harmonic scale are the component parts of the major common chord, by far the most consonant chord that can be produced by five notes. Neglecting octaves, its essential notes are the major triad, C E G, or 4, 5, 6, which, as already seen, consists of a fifth divided harmonically into major third and minor third. The root on which a chord is formed, or the note by whose division into aliquot parts the notes of the chord are produced, is called its fundamental bass, and the fundamental bass of the triad C E G is C. The common chord is the triad with the addition of the octave of the root; its proportions are 4, 5, 6, 8. Every key contains within itself two other triads besides that of the key-note—viz., those of the subdominant and dominant, which have the subdominant and dominant of the key-note respectively for their fundamental basses; and the feeling of satisfaction produced by the diatonic scale arises out of the fact, that its notes belong to a progression of chords formed on a fundamental bass suggested by the ear. This fundamental bass is here indicated on the lower staff—



The relative position of the notes of a chord, and consequently its intervals, may be altered by raising one or more of them an octave; and, on the whole, the nearer the intervals approach to their position in the harmonic scale, the purer is the harmony. Close, in contradistinction to dispersed harmony, is when the notes of a chord are so near that no component note could be placed between them. When the fundamental bass of a chord ceases to be its lowest note, the chord is said to be

inverted. Thus  and  are inversions of the common chord,

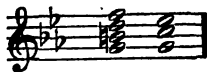
but not , where the fundamental bass is still the lowest note.

The minor triad is, as we have seen, a compound chord, whose ratio is 20, 24, 30, taking its minor third from the triad below, and its major third from the triad above. Its fundamental bass is the key-note. The minor mode has, like the major, three triads in each key—those of the tonic, subdominant, and dominant; and the minor common chord admits of the same inversions as the major, by making the third or fifth the lowest note.

The first seven notes of the harmonic scale contain the chord next in consonance to the common chord, the chord of the seventh or dominant harmony. Rejecting octaves, it is the harmonic triad with the addition of the grave seventh, 4, 5, 6, 7, C E G B $\flat$ , or G B D F, and admits of three inversions, according as the third, fifth, or seventh is taken instead of the root as the lowest note. This chord belongs to the key of which its fundamental note is the dominant; and in order to satisfy the ear, it requires to be followed by a resolution into the common chord of the key, or one of its inversions, the major third rising a semi-tone to the key-note, and the seventh descending one degree—



The dominant seventh note is flatter by an interval of 63, 64 than the subdominant of the key, though the two are not distinguishable on keyed instruments. The chord of the dominant seventh is the same in the tonic minor as in the major mode, but differs in its resolution, in respect that it descends a tone instead of a semitone



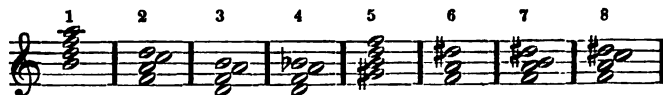
The dominant harmony affords numerous means of modulating from one key to another. For example, the addition of a dominant seventh, to the common chord of a key, effects a modulation into the key of the

sub-dominant. In modulating into the key of the dominant, the supertonic bears the dominant harmony, and becomes dominant of

the new key. For other modulations we must refer to

works on the theory of music.

The following more complex harmonies are also in general use—



1, the chord of the added ninth, consisting of the dominant harmony (its root generally omitted) with the fifth of the adjacent triad above. 2, 3, and 4, the different forms of the added sixth, or chord of the subdominant. 2 is the triad of the subdominant, with the third of the adjacent triad below, or rather its octave; 3 is

the triad of the subdominant, minor mode, with the third of the adjacent triad below; and 4, the same triad with the third of the tonic major to the adjacent triad below. 5, the diminished seventh, a compound of the characteristic notes (B F) of the dominant harmony of the major mode with those (G ♯ D) of the relative minor. 6, 7, and 8, the augmented sixths, all dominant harmonies, resolving into the major tonic. 6, called the Italian sixth (F A D♯), is a compound of the characteristic notes (A D♯) of the dominant harmony of the minor mode (B D♯ F A) inverted, with the dominant seventh note (F) of the major triad (C E G) below for a bass; 7, the French sixth (F A B D♯), the same as the last, with the addition of the octave to the fundamental bass; 8, the German sixth (F A C D♯), compounded of the characteristic notes of the dominant harmony of the minor mode inverted, with the dominant seventh of the major triads below and above.

All classical harmonies can be reduced to the chords enumerated, varied by inversions, omissions, suspensions, and pedal bases. A pedal bass or organ-point is a base note sustained through a progression of chords, to only the first and last of which it is the proper bass. The pedal bass of the tonic is often used with the chord of the dominant seventh, the added ninth, and the diminished seventh, and occasionally with other chords: sometimes the pedal harmonies are taken on the dominant instead of the tonic, and the holding note sometimes occupies an upper part instead of the base—



A musical composition consists of a succession of notes or of chords subject to certain laws. Like discourse, music has its phrases, periods and punctuation. When a piece of music continues in the same key, it is said to move by progression, a term used in contradistinction to modulation, where the key is changed. Progression in music of two parts is of three kinds—oblique, when one part repeats or holds on the same note, while the other moves up and down; direct, where both parts move in the same way; and contrary, where one moves up, and the other down. Consecutive chords should in general be connected, either as having some note in common, or as being the chords of closely connected keys. There are certain chords which require a special resolution—i. e., they must be followed by certain other chords; and there are certain progressions which, from harshness, are in ordinary cases to be avoided, more particularly consecutive fifths, and consecutive octaves, the latter, however, being admissible when used merely to strengthen a part. Modulation is generally effected by introducing the chords common to both keys, and the secret of good modulation consists in the skillful choice of intermediate chords. Every regular piece of music is composed in a particular key, in which it begins and ends, and which predominates over all the other keys into which it has modulated. The keys into which a key most readily modulates, are those most nearly related to

It—viz., the dominant, the subdominant, and the relative and tonic major or minor. We have seen how modulation may take place by introducing the dominant harmony of the new key or one of its inversions, and in this way the entire harmonic circle of the keys can be made, either by ascending or descending fifths; but in order to effect this change, it will be necessary, on reaching the key of *C*, with seven sharps, to substitute, by what is called an *Enharmonic* (q. v.) change, *D*, with five flats, or *vice versa*, which on instruments with temperament produces no real change on the pitch, but merely on the names of the notes.

The arrangement of chords which the ear naturally expects at the close of a strain is called a cadence; it corresponds in music to the period which closes a sentence in discourse. It is perfect when the harmony of the dominant precedes the harmony of the key-note, and imperfect when the harmony of the key-note precedes that of the dominant without its seventh.

The imperfect cadence is the most usual termination of a musical phrase, or short succession of measures containing no perfect musical idea. A portion of melody formed of two regular phrases, and containing a perfect musical idea, is called a section, and its regular termination is the perfect cadence.

Perfect.

Imperfect.



Music is produced by the human voice, and by a variety of artificial instruments. For the application of the voice to musical purposes, see *SINGING*. Musical instruments are classified as stringed instruments, wind instruments, and instruments of percussion. In some stringed instruments, as the pianoforte, the sounds are produced by striking the strings by keys; in others, as the harp and guitar, by drawing them from the position of rest. In a third class, including the violin, viola, violoncello, and double bass, the strings are put into vibration with a bow. In wind instruments, the sound is produced by the agitation of an enclosed column of air; some, as the flute, clarionet, oboe, bassoon, flageolet—instruments of wood, and the trumpet, horn, cornet-a-piston, &c., of metal, are played by the breath; in others, as the organ, harmonium, and concertina, the wind is produced by other means. In the two last-named instruments, the sound is produced by the action of wind on free vibrating springs or reeds. Instruments of percussion are such as the drum, kettle-drum, cymbals, &c. The chief peculiarities of the more important musical instruments are noticed in special articles.

Musical compositions are either for the voice, with or without instrumental accompaniment, or for instruments only. Of vocal music, the principal forms may be classed as church music, chamber music, dramatic music, and popular or national music. The first includes plain song, faux-bourdon, the chorale, the anthem, the sacred cantata, the mass and requiem of the Roman Catholic Church, and the oratorio. Vocal chamber music includes cantatas, madrigals, and their modern successors, glees, as also recitatives, arias, duets, trios, quartets, choruses, and generally all forms, accompanied or unaccompanied, which are chiefly intended for small circles. Dramatic music comprehends music united with scenic representation in a variety of ways, in the ballet, the melodrama, the vaudeville, and the opera, in which last, music supplies the place of spoken dialogue. Instrumental music may be composed for one or for more instruments. The rondo, the concerto, the sonata, and the fantasia generally belong to the former class; to the latter, symphonies and overtures for an orchestra, and instrumental chamber music, including duets, trios, quartets, and other compositions for several instruments, where each takes the lead in turn, the other parts being accompaniments. These and other forms of composition will be found noticed separately.

*History of Music.*—A certain sort of music seems to have existed in all countries and at all times. Even instrumental music is of a very early date: representations of musical instruments occur on the Egyptian obelisks and tombs. The music of the Hebrews is supposed to have had a defined rhythm and melody. The Greeks numbered music among the sciences, and studied the mathematical proportions of sounds. Their music, however, was but poetry sung, a sort of musical recitation or intoning, in which the melodic part was a mere accessory. The Romans borrowed their music from the Etruscans and Greeks, and had both stringed instruments and wind instruments.

The music of modern Europe is a new art, with which nothing analogous seems to have existed among the nations of antiquity. The early music of the Christian Church was probably in part of Greek, and in part of Hebrew origin. The chorale was at first sung in octaves and unisons. St Ambrose and Gregory the Great directed their attention to its improvement, and under them some sort of harmony or counterpoint seems to have found its way into the service of the church. Further advances were made by Guido of Arezzo, to whom notation by lines and spaces is due, but the ecclesiastical music had still an uncertain tonality and an uncertain rhythm. Franco of Cologne, in the 13th c., first indicated the duration of notes by diversity of form. The invention of the organ, and its use in accompanying the chorale, had a large share in the development of harmony. Along with the music of the church, and independently of it, a secular music was making gradual advances, guided more by the ear than by science; it seems to have had a more decided rhythm, though not indicated as yet by bars. The airs which have become national in different countries were developments of it, but it had its chief seat in Belgic Gaul; and the reconciliation of musical science with musical art began in Flanders by Josquin Despré in the 15th c., was completed in the 17th c. by Palestrina and his school at Rome, and reacted eventually on the ecclesiastical style. The opera, which appeared nearly contemporaneously with the Reformation and revival of letters, greatly enlarged the domain of music. Italy advanced in melody, and Germany in harmony. Instrumental music occupied a more and more prominent place. Corelli's compositions exalted the violin. Lulli and Rameau, with their ballet-like music, seized the characteristics of French taste, till the German Gluck drove them out of the field. The scientific and majestic fugue reached its highest perfection under J. S. Bach. The changes introduced in ecclesiastical music in England at the Restoration gave birth to the school of Purcell; and a little later, England adopted the German Handel, who was the precursor of Haydn, Mozart, Beethoven, Spohr, and Mendelssohn. The principal fact in recent musical history is the movement with which the name of Wagner is connected, having for its aim the production and perfection of a true musical drama, in which, unlike the opera, the words and music shall be of equal importance.

See Pepusch's "Treatise on Harmony," Calcott's "Musical Grammar," Hawkins' and Burney's "History of Music," Marx's "Allgemeine Schule der Musik," Brown's "Elements of Musical Science," and Chambers's "Information for the People," Nos. 96-97 (1875).

**MUSIC RECORDER.** Many forms of apparatus have been invented for writing down music in a legible form by the very act of playing it on a keyed instrument, such as the pianoforte or organ. Beginning with 1747, various attempts had been made to effect this object, when, in 1863, Mr Fenby invented and patented his *Phonograph*, in which he brought in the aid of electro-magnetism. His chief aim, as an improvement on previous apparatus, was to devise a method of denoting the length of the notes, as well as their pitch and the interval between them. On pressing down any key of the instrument, a stud on the under side touches a spring; the spring sets in action a small electro-magnetic apparatus, which causes a tracer to pass against a strip of paper moving onward at a uniform rate by means of a cylinder and clockwork. The paper is chemically prepared, so as to receive a brown stain whenever the tracer passes along its surface. The length of each note is expressed by horizontal dashes of greater or less length, made by the tracer; and the arrangement is such as to denote the lines of the staff as well as the character of the note. By subsidiary adjustments, the apparatus is made to express accidental sharps and flats, changes of time, &c.

The Abbé Moigno's *Phonautograph*, introduced to the British Association in

1660, is a contrivance—not for noting down sounds in any kind of musical notation—but for causing a vibrating surface to tell its number and character of vibrations. A kind of spheroidal drum is covered at one end with a diaphragm or stretched membrane; a sheet of paper is carried along this drum-head by means of clock-work; and a system of small levers moves a pen. A tuning-fork, an organ-pipe, or the voice is sounded in proximity to the drum, the body of air within which acts as a reinforcement of the sound; the membrane vibrates in a manner which can be felt by the pen, although not seen by the eye; and the pen makes zigzag markings on the paper. When the sound is produced by a tuning-fork or an organ-pipe, the zigzag lines are so regular that they serve to count the number of vibrations belonging to each particular note. When the sound is that of a singing voice, the markings become very peculiar, especially in such words as contain the gutturals *r, g, &c.*

MUSK, or Musk Deer (*Moschus moschatus*), a ruminant quadruped, the type of the family *Moschidae*. This family differs from *Cervidae* (Deer) in the want of horns, and in the long caudines of the males, projecting beyond the lips. The *M.* is an inhabitant of the elevated mountainous regions and table-lands of Central Asia. The habits of the *M.* are very similar to those of the Chamois. Its favorite haunts are the tops of pine-covered mountains, but its summer range extends far above the region of pines. Its habits are nocturnal and solitary, and it is extremely timid. It is much pursued by hunters on account of its odoriferous secretion, which has been known in Europe since the 8th c., and is much valued as a perfume. This secretion, *musk*, is produced in a glandular pouch situated in the hinder part of the abdomen of the males; and its natural use seems to be that of increasing sexual attractiveness. The musk-bag is formed by an unfolding of a portion of the skin of the belly, within which a number of membranes are contained, and between these membranes are glands by which the musk is secreted. When newly taken from the animal, musk is soft and almost resembles an ointment; it is reddish-brown, and has an excessively powerful odor. Very little of it reaches Europe unadulterated.—Musk is usually imported either in the form of *grain-musk*, that is, the musk which has been collected chiefly from stones upon which it has been deposited by the animal, in which state it is a coarse powder of a dark-brown color; or in the *pod*, that is, in the musk-sac, which is cut altogether from the animal, and dried with the musk inside. Of both kinds the annual importations are about 15,000 ounces per annum, chiefly from China and India. Small quantities are used in medicine, but the greater portion is employed by the perfumers. It is imported in small boxes or caddies, often covered with bright-colored silk, and each containing 25 pods. The kinds generally known in trade are the Tonquin or Chinese, which is worth two guineas an ounce in the pod, or £8. 10s. per ounce in grain; and the Cabardine, Kabardine, or Siberian, which is always imported in pod, and is very inferior, being only worth about 15s. an ounce.

The flesh of the *M.* is sometimes eaten, but has a very strong flavor. The season of migration from the highest and coldest to more temperate regions, is that at which the *M.* is chiefly pursued.—No other animal of the family *Moschidae* yields the perfume called musk, or has more than a rudimentary musk-bag. The other species of *Moschidae* belong to the genus *Tragulus*, and receive the popular name *Cheevrotains*. They have a very elongated muzzle; and the accessory hoofs assume the form of oppressed conical claws. They inhabit the thick woody copses or jungles of the Indian islands, and are the smallest of ruminant quadrupeds. Some of them are not larger than a hare. Their tusks are not so long as those of the Musk. One of them, the *Napu* of Java and Sumatra, has the smallest blood corpuscles of any known animal.

MUSK DUCK (*Cairina moschata*), a species of duck, of the non-oceanic section of *Anatides* (see DUCK); of a genus characterised by an elevated tubercle at the base of the bill, the edges of the mandibles sinuated, the face and lores covered with a bare tuberculated skin, the wings furnished with a knob or spur at the bend. The *M. D.*, or MUSCOVY DUCK—so called, however, through mistake, and receiving its name *M. D.* more appropriately from its musky smell—is a native of the warm parts of America. It is very plentiful in Guiana, in that part of the year when winter reigns in the north. It is a larger bird than the common duck, in its wild state

almost black, with glosses of blue and green, and white wing-coverts, but varies considerably in domestication. It is often to be seen in poultry-yards in Britain, but is rather curious than profitable. It hybridises readily with the common duck, but the hybrid is sterile.—The M. D. of Australia is a very different species belonging to the genus *Biziura*.

**MUSK OX** (*Bos moschatus*, or *Ovibos moschatus*), an animal of the family *Bovidae*, regarded as a connecting-link between oxen and sheep. It inhabits the most northern parts of America, enduring the winter even of Melville Island and Banks' Land; but, like many other animals, it is partially migratory, some individuals or herds seeking more southern regions and better pastures on the approach of winter, whilst some remain in the furthest north. It is not found in Greenland, Spitzbergen, or Siberia. The M. O. is scarcely equal in size to the smallest of Highland cattle, but appears larger from the profusion of long matted woollen hair with which it is covered, and which hangs almost to the ground. The head is covered with long hair as well as the body, the face alone having short hair. Beneath the long hair there is a thick coat of exquisitely fine wool. The head is large and broad; the forehead convex; the extremity of the muzzle hairy. The horns are very broad at the base, and in the male meet on the forehead; they do not rise but bend down on each side of the head, and curve onwards and upwards towards the tip, which tapers to a sharp point. They are about two feet long measured along the curvature; and about two feet in girth at the base; a pair of them sometimes weighing sixty pounds. The limbs are short, the legs have short hair. The tail is very short, and is covered with long hair, so that it is undistinguishable to the sight. The general color is brown. The female is smaller than the male, has shorter hair on the chest and throat, and smaller horns. The frog of the hoof is short, and partially covered with hair; the foot-marks are very similar to those of the reindeer.

The M. O. feeds on grass, twigs, lichens, &c. It is fleet and active, very sure-footed on rocky ground, and ascends or descends very steep hills with great ease. It is gregarious; the herds generally number thirty or forty. The powerful horns are excellent weapons of defence against wolves and bears, which are often not only repelled but killed. When musk oxen are assailed by firearms, however, they generally huddle more and more closely together, and do not even seek safety by flight, so long as the assailants are unseen. The flesh is much prized by the Esquimaux, but retains much of the strong musky odor which characterises the living animal. The horns are used for various purposes; particularly the wide base for vessels. The fine wool has been spun and woven into a fabric softer than silk. No attempt has yet been made to domesticate the M. O.; which, however, seems worthy of it, and suitable for all cold regions.

**MUSK PLANT**, Musk Root, Musk Tree, Musk Wood. Different parts of a number of plants smell more or less strongly of musk. Among these are the common little Musk Plant (see *MIMULUS*), the Musk-tree of Van Diemen's Land (see *ACACIA*), and the Musk Ochro (see *HIBISCUS*).—The musk-tree of Jamaica (*Moschazylon Swartzii*) belongs to the natural order *Meliaceæ*. It emits from all parts a smell of musk.—All parts of *Guarea grandifolia*, another tree of the same order, a native of the West Indies, sometimes called musk wood, also smells strongly of musk, but particularly the bark, which is used in perfumery.—The drug called **MUSK ROOT** or **SAMBUL** is brought from the East, and is the root of a plant supposed to be of the natural order *Umbelliferae*; but the plant is unknown, nor is it certain whether its native country is Persia, or some more remote region of Central Asia. It has a pure musky odor, and is used as a substitute for musk.

**MUSK RAT**, or **Desman** (*Mygale or Galemys*), a genus of insectivorous quadrupeds of the Shrew (q. v.) family (*Soricidae*), differing from the true Shrews (*Sorex*) in having two very small teeth between the two large incisors of the lower jaw, and the upper incisors flattened and triangular. Behind these incisors are six or seven small teeth (lateral incisors or false canine teeth) and four jagged molars. The muzzle is elongated into a small flexible proboscis, which is constantly in motion. The eyes are very small; there are no external ears; the fur is long, straight, and divergent; the tail long, scaly, and flattened at the sides. All the feet have five toes, fully webbed; and the animals are entirely aquatic, inhabiting lakes and rivers, and making holes in the banks with the entrance from beneath the surface of the water.



**Musk**  
**Mussel**

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Only two species are known, one (*M. or G. Pyrenaica*) about eight inches long, with tail as long as the body, a native of the streams of the Pyrenees; another larger species (*M. or G. moschata*), very plentiful in the Volga and other rivers and lakes of the south of Russia, nearly equal in size to the common hedgehog, with tail about three-fourths of the length of the body. The Russian desman is blackish above, whitish beneath; it has long silky hair, with a softer felt beneath, and its fur is held in some esteem. Desman skins, however, are chiefly valued on account of the musky odor which they long exhale, and which is derived from a fatty secretion produced by small follicles under the tail of the animal. The desman feeds on leeches, aquatic larvae, &c., searching for them in the mud by means of its flexible proboscis. It seldom, if ever, voluntarily leaves the water, except in the interior of its burrows, which are sometimes twenty feet long.

**MUSK RAT** (*Sorex murinus*), an Indian species of Shrew (q. v.), in size about equal to the common brown rat, in form and color much resembling the common shrew of Britain, but remarkable for the powerful musky odor of a secretion which proceeds from glands on its belly and flanks. This odor adheres most pertinaciously to any object with which the animal may come in contact, and provisions are often utterly spoiled by it. Even wine and beer are said to be spoiled by it, in spite of the glass and cork of the bottle; although the probability is much greater that it adheres to the outside of the bottle, and that the liquid is spoiled as it is poured out. One of the Indian names of this animal is *Sondelt*.

**MUSK RAT.** See **MUSQUASH**.

**MUSKET**, or *Musquet* (Fr. *mousquet*; from *mouchet*, a sparrow-hawk; in the same way that other shooting implements were named *falcon*, *falconet*, &c.), the firearm for infantry soldiers, which succeeded the clumsy harquebuss, and in 1851 gave way before the Enfield rifle, which, in its turn, was converted into Snider's patent breech-loading rifle, now known as the Snider-Enfield; the latter arm, so far as the regular in infantry is concerned, has been replaced by the Martini-Henry breech-loader, but the navy, cavalry, and auxiliary forces still retain the Snider. The first muskets were matchlocks; after which came wheel-locks, snaphaups or snaphaues, and flint muskets; and lastly, percussion muskets, which were a vast improvement, both for accuracy and lightness, on all which had gone before. Compared, however, to either the Enfield or Martini-Henry rifle, the musket, familiarly known as Brown Bess (possibly a corruption of Ger. *büchse*, a hollow tube or gun)—was a heavy ugly, and ineffective weapon. The following is a table of the ranges attained, on an average, by the musket, the Enfield, and the Martini-Henry:

	Musket.	Enfield Rifle.	Martini-Henry Rifle.
	yds.	yds.	yds.
Accurate fire.....	100	600	1200
Effective against detached parties.....	150	800	1500
Effective against troops in column.....	250	1000	1800

**MUSKETTOON**, an obsolete weapon, was a short musket of very wide bore, carrying a ball of five ounces, and sometimes bell-mouthed like a blunderbuss.

**MUSKETRY**, Schools of. When the introduction of the Minié rifle in the French service, and the subsequent arming of the British troops with the still more delicate Enfield rifle in 1851, brought the accuracy of a soldier's fire to be an important consideration in estimating his value (which with the old musket was not the case, as it was proverbial that the bullet never hit the point aimed at, however carefully), the English government at once saw the necessity of providing instruction in the manipulation of the rifle. Accordingly, instructors of musketry were attached to the troops, one to each regiment; and a school was established at Hythe in 1854, under the late General (then Colonel) Hay, where lessons on the theory of the arm, and practice in its actual employment, were the sole occupation of the day. Officers and promising men were sent there as fast as the accommodation permitted; and after a course of a few weeks were able to return to their corps, and become instructors to their comrades, so that the shooting of the whole army soon rose in a surprising degree. Whereas, before the establishment of this school, the English stood low in the scale of shooting, the competitions held during recent years at Wimble-

don have demonstrated that no nation can now excel them as marksmen. The formation of the volunteer corps, in 1859, led to a greatly increased demand for musketry instruction, which the government met by forming a second school of musketry at Fleetwood (now abandoned), where the troops and volunteers of Scotland, Ireland, and the northern English counties, found the necessary teaching. The Hythe school is superintended by a commandant and inspector-general of musketry instruction, with subordinate instructors. The inspector-general is responsible also for the instruction throughout the regiments all over the world, and to him the musketry returns from each regiment are sent annually.

MUSLIN, a cotton fabric of Oriental origin, is said to have derived its name from the town of Mosul, in Mesopotamia, where this material was at one time very largely manufactured. At present no such trade exists there; and for muslins, of the common kinds at least, the Indian market depends upon the manufactures of England and France. But no European manufacturer has ever been able to rival the wonderfully fine muslins of Dacca. This does not arise so much from the fineness of the yarn, although that too is very great, but from the marvellous fineness conjoined with a most delicate softness to the touch. The fineness of the yarn is so great, that until lately no machinery could produce anything like it; a piece of Dacca muslin, shewn in the International Exhibition (1862), was 81 feet in length by 3 feet in width, and contained in a square inch 104 warp threads and 100 weft threads, yet the entire piece weighed only 3½ ounces. A French manufacturer, M. Thivel Michon of Tavares, has made a muslin of English yarn spun by the Messrs Houldsworth of Manchester, which surpassed the finest Dacca in the excessive thinness of the yarn, but it wanted its delicate softness. Muslin is much less compact in its texture than calico, indeed it more nearly resembles gauze in appearance; but it is woven plain, without any twisting of the weft threads with those of the warp. The manufacture of muslins in Great Britain and France is very extensive, especially printed muslins, in which the patterns are produced by the same processes as in calico-printing. See WEAVING.

MU'SNUD, a Persian throne of state.

MUSOPHA'GIDÆ. See PLAINTAIN-EATER.

MUSQUASH, Musk-Rat, or Ondatra (*Fiber zibethicus*), a rodent quadruped, a native of North America. It is the only known species of the genus to which it belongs, which is characterised by dentition similar to that of the voles; in some other characters more nearly agreeing with the beaver. The M. is in shape nearly similar to the brown rat; the head and body are about 15 inches in length, the tail ten inches. The whole body is covered with a short dawny dark-brown fur, intermixed with longer and coarser hairs. It is common in almost all parts of North America, from lat. 30° to lat. 69°, except in the southern alluvial districts. It is a very aquatic animal, seldom wandering from the rivers, lakes, or marshes in which it makes its abode. The fur is in demand, and forms an article of commerce—skins in large number being still exported from America to Britain and other European countries. The M. burrows in the banks of streams and ponds; the entrances of its burrows being always under water, so that it must dive to reach them. In marshes, the M. builds a kind of hut, collecting coarse grasses and mud, and raising the fabric from two to four feet about the water. The flesh of the M., at those seasons when it is fat, is in some request among the American Indians, and is said to be not unpalatable.

MUSSEL (*Mytilus*), a genus of lamellibranchiate molluscs, the type of the family *Mytilidæ*, which, however, is much more restricted than the Linnean genus *Mytilus*. The *Mytilidæ* belong to the division of *Lamellibranchiata*, called by Lamarck *Dinyparia*, having two adductor muscles—muscles employed in closing the valves of the shell. The mantle has a distinct anal orifice; the foot is small; and there is a large *Byssus* (q. v.), which is divided into fibres to its base. The valves of the shell are equal; the hinge is destitute of teeth. Some, but few, of the species are found in fresh-water. See DREISSENA. Some (*Lithodomus*) burrow in stone. How they do it is utterly unknown, but they do burrow even in the hardest stone; and some small tropical species excavate for themselves holes in the shells of great limpets. The *Lithodomus* are sometimes called *Datys* shells. Some of them are very beautiful,

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Mustard

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which is the case also with the true mussels, after the epidermis is removed. Even the COMMON *M. (M. edulis)* then exhibits beautiful veins of blue. This species is very abundant on the British coasts, and is much used as bait by fishermen. It is gregarious, and is found in vast beds, closely crowded, adhering by the byssus to rocks, &c. These beds are usually uncovered at low-water. The shell is oblong; at its greatest size about three inches long, and an inch and a half broad. Mussels, when young, move about by means of the foot, with which they lay hold of objects, and drag themselves along, until they find some suitable spot to anchor themselves by a byssus. If detached, they soon find another anchorage. In an aquarium they readily attach their byssus-threads even to the smooth glass, and the threads may be broken more easily than separated from the glass. An ingenious and important application of the strength of these threads has been made by the French, to render Cherbourg breakwater more secure by binding the loose stones together, for which purpose it was planted with tons of mussels. The Common *M.* is much used as an article of food, and is generally found quite wholesome; yet it sometimes proves poisonous, particularly in spring and summer, either causing blotches, swellings, and an eruption, accompanied with asthma, or a kind of paralysis, and even sometimes producing delirium and death. For the FRESH-WATER MUSSEL, see that article.

MUSSELBURGH, a small seaport and royal and parliamentary burgh of Scotland, in the county of Edinburgh, is situated at the mouth of the Eek, 6 miles east of Edinburgh. On the west side of the Eek is the fishing village of Fisherrow. Tanning, leather-dressing, and the manufacture of sailcloth, nets, and salt are carried on. The harbor of Fisherrow is frequented by coasting craft, and by small vessels from Holland and the Baltic. Timber, oil-cake, bark, seeds, and hides are imported; coal is the chief export. On the "links," a famous golfing ground, the Edinburgh races take place annually. *M.* unites with Leith and Portobello in sending a member to Parliament. Pop. (1871) 7517.

MUSSET, Louis Charles Alfred de, one of the foremost of recent French poets, was born at Paris, 11th Nov. 1810. He studied in succession medicine, law, finance, and painting; but finally, under the influence of the Romantic School (q. v.), devoted himself to poetry. The first work that attracted notice was "*Les Contes d'Espagne et d'Italie*" (1830), which by their elegant but audacious sensuousness gave deep offence. "*Le Spectacle dans un Fauteuil*" (1832) is a strange medley of contrasts. "*Les Nuits*" (1840), admittedly show his lyrical power at its best. Many of the "*Comédies et Proverbes*" were popular on the stage; and *M.* wrote several prose romances. In 1852 he was admitted to the French Academy. He died at Paris, 2d May 1857. The exquisite beauty, tenderness, and power of much of *M.*'s work is continually marred by the morbid pessimism of a man prematurely old, disillusioned, *blasé*; on this very ground *M.* is often regarded as the representative poet of the modern Parisian.

MU'STANG. See HORSE.

MUSTARD (*Sinapis*), a genus of plants of the natural order *Crucifera*, having yellow flowers, and linear or oblong pods, which terminate in a sword-shaped and compressed or 4-cornered beak, and contain one row of seeds. The seeds are globular, and their Cotyledons (q. v.) conduplicate.—The most important species is BLACK *M.* (*S. nigra*), an annual, which grows wild in fields and by waysides in the middle and south of Europe, and is not uncommon in the southern parts of Britain. Its pods are bluntly 4-angled, smooth, erect, and lie close to the stem, their valves 1-nerved; the leaves are smooth, the lower leaves lyrate, the upper leaves linear-lanceolate. The seeds are brownish black.—WHITE *M.* (*S. alba*), also a native of most parts of Europe, and of the southern parts of Britain, is an annual, having divergent pods covered with stiff hairs, the valves 5-nerved, the seeds yellowish, the leaves pinnatifid.—Both these species are cultivated in England and elsewhere, for their seeds, which are ground into powder and mixed with water, to make the well-known condiment called *Mustard*. The powder of the seeds is also much used in medicine as a rubefacient. The use of *M.* as a condiment is often found favorable to digestion. *M.* seeds depend for their purgency on a principle which, when water is added to Black *M.*, forms *Volatile Oil of Mustard*. (See next article.) There is also in the seeds a bland fixed oil, *Oil of M.*, which is obtained from them by expression, and

constitutes about 28 per cent. of their weight. The cake which remains after the oil is expressed, is too acrid to be freely used for feeding cattle. It is Black M. which is chiefly cultivated, its seed being more pungent and powerful than that of White M.; but there is more difficulty in removing the skin of its seed than that of White M., which is therefore often preferred, but more in England than on the continent of Europe. M. requires a very rich soil. It is cultivated on the alluvial lands of the level eastern counties of England. Wisbeach, in Cambridgeshire, is the great M. market of England.—White M. is often sown in gardens and forced in hot-houses, to be used in the seed-leaf as a small salad, having a pleasant pungency. It is also sometimes sown for feeding sheep, when turnip or rape has failed, being of very rapid growth, although inferior in quantity of crop.—WILD M., or CHARLOCK (*S. arvensis*), which is distinguished by turgid and knotty pods with many angles and longer than the two-edged beak, is a most troublesome annual weed in cornfields in Britain, often making them yellow with its flowers in the beginning of summer. Its seeds are said to have yielded the original *Durham M.*, and are still gathered for mixing with those of the cultivated species. The bland oil of the seeds is used for lumps.—PEKIN M. (*S. Pekinensis*) is an annual, very extensively cultivated in China, its leaves being used as greens. It is quite hardy in the climate of Britain.—INDIAN M. (*S. ramosa*) is extensively cultivated in India for its seeds, which are used as a condiment; as are those of *S. dichotoma* and *S. glauca*, also cultivated in India. The oil of the seeds is much used throughout India for lamps. HILL M. is a different genus, *Bunias* (q. v.).—The M. TREE of Scripture is supposed to be *Salvadora Persica*, a small tree of the natural order *Salvadoraceae*, a small order allied to *Myrsinaceae*. It abounds in many parts of the East. The seed has an aromatic pungency, and is used like mustard. The fruit is a berry with a pungent taste.

**Manufacture.**—The manufacture of M. as it was originally used in this country, and as it still is on the continent, consisted in simply grinding the seed into very fine meal. A false taste, however, arose for having an improved color, and the flour of mustard was introduced, in which only the interior portion of the seed is used, the husk being separated, as the bran is from wheaten flour. This causes a great loss of flavor, as the pungent oil, on which the flavor chiefly depends, exists in greatest abundance in the husk.—Hence other materials, such as capsicum powder, and other very pungent matters, are added to bring up the flavor, and wheaten flour and other substances are added to increase the bulk and lightness of color. Indeed, so many sophistications have been added, that the M. of the English tables can no longer be regarded in any other light than an elaborately compounded condiment, for which each manufacturer has his own particular recipe.

**MUSTARD, Oil of.** The seeds both of the black and the white mustard yield by expression a large quantity of a bland fixed oil, but they do not contain any essential or volatile oil ready formed. It is only the black mustard which by distillation yields the compound usually known as the oil or essence of mustard, and which is in reality sulphocyanide of allyl (see GARLIC, OIL OF) contaminated with a little brown resinous matter, from which it may be freed by simple re-distillation.

When first obtained, it is a colorless fluid, which gradually becomes yellowish. It has a painfully pungent odor and acrid taste; and when applied to the skin, it speedily raises a blister. It is soluble in all proportions in alcohol, but dissolves very sparingly in water. In the article already referred to, it has been shewn that this oil and oil of garlic are naturally convertible into one another; in combination with ammonia it forms a compound which is termed *thiosinnamine*, and which combines directly with acids like a true organic base. Its mode of formation is explained by the equation—

Oil of Mustard. Ammonia. Thiosinnamine.



By digesting oil of mustard with alkalis, or with hydrated oxide of lead, we also obtain a feeble base termed *sinapoline*, whose formula is  $\text{C}_{14}\text{H}_{12}\text{N}_2\text{O}_2$ .

The oil is formed in much the same way as the Volatile Oil of Almonds (q. v.). The black mustard contains the potash salt of a compound termed *myronic acid*, and a peculiar coagulable nitrogenous ferment, which, when the crushed seed is moistened with water, act upon each other, and develop the oil. It is the gradual

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Mutiny

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formation of this oil, when powdered mustard and warm water are mixed, that occasions the special action of the common mustard poultice. The pungency of mustard as a condiment, of horse-radish, &c., is mainly due to the presence of this oil.

**MUSTELIDÆ**, a family of digitigrade Carnivora (q. v.), mostly forming the genus *Mustela* of Linneus; now divided into a number of genera, in which are ranked the weasel, ermine or stoat, sable, marten, ferret, polecat, mink, skunk, &c. The *M.* are distinguished by the elongated form of the body, and the shortness of the limbs; also by having generally four or five molars on each side in the upper jaw, and five or six in the lower. On each side of both jaws there is a single tuberculate tooth. All the feet have five toes. The skull is much elongated behind the eyes. The *M.* display great litheness and suppleness of movement. They are very carnivorous. Otters are ranked among the mustelidæ.

**MUSTER** (It. *mostrare*, from Lat. *monstrare*, to shew) is a calling over of the names of all the men composing a regiment or a ship's company. Each man present answers to his name, those not answering being returned as absent. The muster-roll from which the names are called is the paymaster's voucher for the pay he issues, and must be signed by the commanding officer, the adjutant, and himself. The crime of signing a false master-roll, or of personating another individual at a muster, is held most severely punishable—by imprisonment and flogging for a common soldier, by immediate cashiering in the case of an officer. In regiments of the line, a muster is taken on the 24th of each month; in ships of war, weekly. The muster after a battle is a melancholy proceeding, intended to shew the casualties death has wrought. In early times, before the army was a standing force, and when each captain was a sort of contractor to the crown for so many men, the muster was most important, as the only security the sovereign had that he really obtained the services of the number of men for whom he paid. Accordingly, any fraud, as making a false return, or as mustering with his troop men not actually serving in it, was by the Articles of War of Henry V. made punishable with death for the second offence, and by Charles I. with death "without mercy" for even the first such crime; while any person abetting in any way in the fraud shared the penalty.

**MU'SULMAN**, *Moslem*, a Mohammedan (from Arab. *Salama*), equivalent to Moslem, of which word it is, properly speaking, the plural; used in Persian fashion for the singular. We need hardly add that this Arabic plural termination of "ân," has nothing whatever to do with our word *man*, and that a further English plural in *men*, is both barbarous and absurd.

**MUTE**, a small instrument used to modify the sound of the violin or violoncello. It is made of hard wood, ivory, or brass, and is attached to the bridge by means of a slit, a leg of it being interjected between every two strings. The use of the mute both softens the tone, and imparts to it a peculiar muffled and tremulous quality, which is sometimes very effective. Its application is indicated by the letters, *a. a.*, or *con sordina*, and its discontinuance by *a. a.*, or *senza sordina*. The mute is sometimes used for the cornet, being inserted into the bell of the instrument, thereby subduing the sound, and producing the effect of great distance.

**MUTINY** (Fr. *mutiner*, from *mutin*, "riotous." "Mutin" is connected with an old French *meute*, still seen in *émeute*, a "sedition," and is therefore from the Latin *movere*, "to move" or "stir up." The supposition that the word is derived from the Latin *mutio*, a "muttering," is a mistake). The term is used to denote behavior either by word or deed subversive of discipline, or tending to undermine superior authority. Till lately, mutiny comprised speaking disrespectfully of the sovereign, royal family, or general commanding, quarrelling, and resisting arrest while quarrelling, but these offences have now been reduced to the lesser crime of "mutinous conduct." The acts now constituting mutiny proper are, exciting, causing, or joining in any mutiny or sedition; when present thereof, failing to use the utmost effort to suppress it; when, knowing of a mutiny or intended mutiny, failing to give notice of it to the commanding officer; striking a superior officer, or using or offering any violence against him, while in the execution of his duty; disobeying the lawful command of a superior officer. The punishment awarded by the Mutiny Act to these crimes is, if the culprit be an officer, death or such other punishment as

a general court-martial shall award; if a soldier, death, penal servitude for not less than four years, or such other punishment as a general court-martial shall award. As the crime of mutiny has a tendency to immediately destroy all authority and all cohesion in the naval or military body, commanding officers have strong powers to stop it summarily. A drum-head court-martial may sentence an offender, and if the case be urgent, and the spread of the mutiny apprehended, the immediate execution of the mutineer may follow within a few minutes of the detection of his crime. It, however, behoves commanding officers to exercise this extraordinary power with great caution, as the use of so absolute an authority is narrowly and jealously watched. To prevent mutiny among men, the officers should be strict without harshness, kind without familiarity, attentive to all the just rights of their subordinates, and, above all things, most particular in the carrying out to the very letter of any promise they may have made.

MUTINY ACT is an Act of the British parliament, passed from year to year, investing the crown with large powers to regulate the good government of the army and navy, and to frame the articles of war. By the Bill of Rights, the maintenance of a standing army in time of peace, unless by consent of parliament, was declared illegal, and from that time the number of troops to be maintained, and the cost of the different branches of the service, have been regulated by an annual vote of the House of Commons. But parliament possesses a further and very important source of control over the army. Soldiers, in time of war or rebellion, being subject to martial law, may be punished for mutiny or desertion; but the occurrence of a mutiny in certain Scotch regiments soon after the Revolution, raised the question, whether military discipline could be maintained in time of peace; and it was decided by the courts of law, that, in the absence of any statute to enforce discipline and punish military offences, a soldier was only amenable to the common law of the country; if he deserted, he was only liable for breach of contract, or if he struck his officer, to an indictment for assault. The authority of the legislature thus became indispensable to the maintenance of military discipline, and parliament has, since 1689, at the beginning of every session, conferred this and other powers in an act called the Mutiny Act, limited in its duration to a year. Although it is greatly changed from the form in which it first passed, 175 years ago, the annual alterations in this act are now very slight, and substantially it has a fixed form. The preamble starts with the above quoted declaration from the Bill of Rights, and adds, that it is judged necessary by the sovereign and parliament that a force of such a number should be continued, "for the safety of the United Kingdom, the defence of the possessions of the crown;" while it gives authority to the sovereign to enact Articles of War for the control and government of the force granted. The act comprises 107 clauses, of which the first five specify the persons liable to its provisions—viz., all enlisted soldiers or commissioned officers on full pay, and to those of the regular army, militia, or yeomanry, when employed on active service, and to recruits for the militia while under training. Clauses 6—14, treat of courts-martial, their procedure and powers. Clauses 15—28, relate to crimes and their punishment, the leading offences being mutiny, desertion, cowardice, treason, insubordination, for each of which death may be the penalty; frauds, embezzlement, &c., for which penal servitude is awarded. Clauses 29—33, provide for the government of military prisons, and for the reception of soldiers in civil jails, under the sentences of courts-martial. Clauses 34—37, enact rules to guide civil magistrates in apprehending deserters or persons suspected of desertion. Clause 38 refers to furlough; 39—41, on the privileges of soldiers, enact that officers may not be sheriffs or mayors; that no person acquitted or convicted by a civil magistrate or jury be tried by court-martial for the same offence; and that soldiers can only be taken out of the service for debts above £20, and for felony or misdemeanor. Clauses 42—59, have reference to Enlistment (q. v.); 60—74, to stoppages, billets, carriages, and ferries, providing for the compulsory conveyance and entertainment of troops by innkeepers. Clause 75 relates to the discharge of soldiers; and the remaining 23 clauses advert to miscellaneous matters, and the penalties under the act on civil functionaries who neglect to comply with its requirements. By clauses 106 and 106 the militia, yeomanry, and volunteers, may, on emergency, be attached to the Regular Forces. Clause 107 renders a soldier liable to maintain his wife and children, and his bastard children.

## MUTUAL INSTRUCTION. See MONITORIAL SYSTEM.

**MU'TTRA**, or Mathurá, a town of British India, capital of a district in the n. w. Provinces, 97 miles s.e. of Delhi, is situated on the right bank of the Jamna. The fort was built by the celebrated astronomer, Jey Singh (who became Prince of Amber in 1698); and on the roof of one of the apartments is a ruinous observatory, containing a great number of astronomical instruments. Access is had to the river—which, along with the town, is considered sacred by the Hindus—by numerous gháts, ornamented with little temples; and its banks are, every morning and evening, crowded by devotees of all ages and both sexes, to perform their religious exercises. In Hindu Mythology, it is regarded as the birthplace of the divinity Krishna. In honor of the monkey-god Hanuman, monkeys are here protected and fed, being allowed to swarm everywhere. There are also great numbers of parrots, peacocks, and sacred bulls at large, without owners. There is a very extensive military cantonment about a mile south of the town. *M.* appears at an early period to have been of much more importance than it is at present; and its enormous wealth and splendor made it an object of attack to the first Afghan invaders. Mahmud of Ghuznee, in 1017, gave it up to plunder, breaking down and burning all the idols, and amassing a vast quantity of gold and silver, of which the idols were made. After this calamity, it sank into comparative obscurity. In Oct. 1803, it was, without resistance, occupied by the British troops. Pop. (1872) 59,281.

**MU'TULE**, a plain block under the corona of the cornice of the Doric style, similar in position to the modallio of the Corinthian order, and having a number of guttæ or drops worked on the under side. See ENTABLATURE.

**MU'TUUM** is a term used in Scotch Law, borrowed from the Roman law, to denote a contract of loan of a certain kind of things, as corn, wine, money, which are consumed in the use, and as to which the borrower is bound to restore as much of the same kind at some future time.

**MUZA IBN NOSEYR**, the Arab conqueror of Spain, was born 640 A.D. He displayed great bravery and high military talents in the contests of that turbulent period, so much so that he was appointed by the calif general of the army which was raised for the conquest of Africa in 698—699. After an insignificant expedition into the interior of Africa, he set out in 707 for Mauritania, conquering the kindred tribes of Eastern Barbary, and enrolling their warriors under his standard; and by 709, the whole of Northern Africa, including the Gothic strongholds on the coast, acknowledged the authority of the calif. At this period the Gothic monarchy in Spain was in a state of complete disorganisation, and *M.*, seizing the favorable opportunity thus presented, sent his lieutenant, Tarik Ibn Zefad, in April 711 to make an incursion into Spain. Tarik landed at Gibraltar, marched inland to the banks of the Guadalete, where he was met by Roderic the Gothic king. In the battle which ensued, the Goths were decisively vanquished, their king perished in the waters of the Guadalete, and the whole of Southern Spain lay at the mercy of the victor. *M.*, on hearing of these successes, sent orders to Tarik to halt for further instructions; but the lieutenant, flushed with success, pressed on to the very centre of Spain, and seized Toledo, the capital of the Gothic kingdom. *M.* immediately set out for Spain at the head of 18,000 men (June 712), took Seville, Carmona, Merida, and other towns, and then marched upon Toledo, where he joined Tarik, whom he caused to be bastinadoed and incarcerated, but afterwards reinstated in obedience to an order from the calif. *M.* then marched first north-west and then east, subduing the country as he went; he then crossed the Pyrenees into France, but soon after returned to Spain, where he and Tarik received messages from the calif, commanding their immediate presence at Damascus; Tarik immediately obeyed, but *M.* delayed till a second message was sent to him. On reaching Damascus, he was treated with neglect, and, on the accession of the Calif Suleiman, was cast into prison, and mulcted in 200,000 pieces of gold; his two sons were deprived of their governments of Kairwan and Tangier; and the third son, who governed Spain in his father's absence, was beheaded, and his head sent to Muza. *M.* died soon after in the greatest poverty, at Hedjaz, 717 A.D.

**MYCELIUM**, in Botany, a development of vegetable life peculiar to *Fungi*, but apparently common to all the species of that order. The *spawn* of mushrooms is

the Mycelium. The *M.* appears to be a provision for the propagation of the plant where its spores may not reach, its extension in the soil or matrix in which it exists, and its preservation when circumstances are unfavorable to its further development. It consists of elongated filaments, simple or jointed, situated either within the matrix or upon its surface. It is often membranous or pulpy. The development of the fungus in its proper form seems to be ready to take place, in proper circumstances, from any part of the Mycelium. Fungi often remain long in the state of *M.*, and many kinds of *M.* have been described as distinct species and formed into genera. Fries has rendered great service to botany in investigating these spurious species and genera, and determining their true nature.—Liquors, in which the flocculent *M.* of a fungus is spreading, are said to be *mother*.

MYCENÆ, a very ancient city in the northeastern part of Argolis, in the Peloponnese, built upon a craggy height, is said to have been founded by Persens. It was the capital of Agamemnon's kingdom, and was at that time the principal city in Greece. About 463 B. C., it was destroyed by the inhabitants of Argos, and never rose again from its ruins to anything like its former prosperity. In Strabo's time its ruins only remained; these are still to be seen in the neighborhood of Kharvati, and are specimens of Cyclopean architecture. The most celebrated is the "Gate of Lions," the chief entrance to the ancient Acropolis. Excavations prosecuted at *M.* by Dr Henry Schliemann, brought to light in 1876 several ancient tombs, containing a large quantity of gold and silver ornaments, &c.

MYELITIS (*myelos*, marrow) is the term employed to signify inflammation of the substance of the spinal cord. It may be either acute or chronic, but the latter is by far the most common affection. The *chronic* form begins with a little uneasiness in the spine, somewhat disordered sensations in the extremities, and unusual fatigue after any slight exertion. After a short time paralytic symptoms appear, and slowly increase. The gait becomes uncertain and tottering, and at length the limbs fail to support the body. The paralysis finally attacks the bladder and rectum, and the evacuations are discharged involuntarily; and death takes place as the result of exhaustion, or occasionally of asphyxia if the paralysis involves the chest. In the *acute* form there is much pain (especially in the spinal region), which usually ceases when paralysis supervenes. The other symptoms are the same as those of the chronic form, but they occur more rapidly and with greater severity, and death sometimes takes place in a few days.

The most common causes of this disease are falls, blows, and strains from over-exertion; but sexual abuses and intemperate habits occasionally induce it. It may also result from other diseases of the spine (as caries), or may be propagated from inflammation of the corresponding tissue of the brain.

The treatment, which is much the same as that of inflammation elsewhere, must be confined entirely to the medical practitioner; and it is therefore unnecessary to enter into any details regarding it. When confirmed paralysis has set in, there is little to hope for, but in the early stage the disease is often checked by judicious remedies.

MYGALE, a genus of spiders, the type of a family called *Mygalidæ*. They have four pulmonary sacs and spiracles, four spinnerets, eight eyes, and hairy legs. They make silken nests in clefts of trees, rocks, &c., or in the ground, sometimes burrowing to a great depth, and very tortuously. To this genus belongs the bird-catching Spider (q. v.) of Surinam; but it seems now to be ascertained that several of the larger species frequently prey on small vertebrate animals. They do not take their prey by means of webs, but hunt for it and pounce upon it by surprise. They construct a silken dwelling for themselves in some sheltered retreat. Some of them make a curious lid to their nest or burrow. They envelop their eggs, which are numerous, in a kind of cocoon.

MYLABRIS, a genus of coleopterous insects, nearly allied to *Cantharis* (q. v.), and deserving of notice because of the use made of some of the species as blistering flies. *M. eichorii* is thus used in China and India; and *M. Fuessetini*, a native of the south of Europe, is supposed to have been the blistering fly of the ancients.

MYLITTA (? corresponding to Heb. *Meyleadeh*, Genitrix, who causes to bear), a female deity, apparently first worshipped among the Babylonians, who gradually



**Myllodon**  
**Myrrh**

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spread her worship through Assyria and Persia. She is originally, like almost every other mythological deity, a cosmic symbol, and represents the female portion of the twofold principle through which all creation burst into existence, and which alone, by its united active and passive powers, upholds it. *M.* is to a certain degree the representative of Earth, the Mother who conceives from the Sun, Bel or Baal. *M.* and Baal together are considered the type of the "Good." Procreation thus being the basis of *M.*'s office in nature, the act itself became a kind of worship to *M.*, and was hallowed through and for her. Thus it came to pass that every Babylonian woman had once in her life to give herself up to a stranger, and thereby considered her person consecrated to the great goddess. The sacrifice itself seems, especially in the early stage of its introduction among the divine rites of the primitive Babylonians, to have had much less of the repulsiveness which, in the eyes of highly-cultivated nations, must be attached to it; and it was only in later days that it gave rise to the proverbial Babylonian lewdness. Herodotus's account of this subject must, like almost all his other stories, be received with great caution.

**MY'LODON** (Gr. grinder-tooth), a genus of huge fossil sloths, whose remains are found in the Pleistocene deposits of South America, associated with the *Megatherium* and other allied genera. A complete skeleton, dug up at Buenos Ayres, measured 11 feet from the fore part of the skull to the end of the tail. Although like the modern sloth in general structure and dentition, its immense size forbids us to suppose that it could have had the same arboreal habits, and the modifications of its structure seem to have fitted it for the uprooting and prostrating of the trees, the foliage of which supplied it with food.

**MY'NIAS**, more accurately *MINYAS*, was, in Greek mythology, the son of Chryseas. He was king of Jolcos, and gave his name to the people called *Minyæ*. He built the city of Orchomenus, where rites (named after him) were celebrated in his honor. His three daughters Clymene, Iris, and Alcithoë, according to Ovid, but Leucothea, Leucippe, and Alcithoë according to other authors, were changed into bats for having contemned the mysteries of Bacchus.

**MYNPURI**, or Mainpuri, a town of British India, capital of a district in the N. W. Provinces, is situated on the banks of a small affluent of the Ganges, 160 miles south-east of Delhi. It lies at an elevation of 820 feet above the sea, and is a favorite station for troops, as provisions and water are abundant and good. *M.* possesses a Jain temple. The rebels were driven from this place in 1857. Pop. (1871) 21,179.

**MYOSO'TIS.** See FORGET-ME-NOT.

**MY'RCIA**, a genus of trees of the natural order *Myrtaceæ*, to which belongs the **WILD CLOVE** or **WILD CINNAMON** of the West Indies (*M. acris*) a handsome tree of 90 or 80 feet high. Its timber is very hard, red, and heavy. Its leaves have an aromatic cinnamon-like smell, and an agreeable astringency, and are used in sauces. Its berries are round, and as large as peas, have an aromatic smell and taste, and are used for culinary purposes.—The leaves, berries, and flower-buds of *M. pimentoides* have a hot taste and fragrant smell, and are also used for culinary purposes.

**MYRIA'PODA** (Gr. myriad-footed), a class of *Articulata*, resembling *Annelids* in their lengthened form, and in the great number of equal, or nearly equal, segments of which the body is composed; but in most of their other characters more nearly agreeing with insects, among which they were ranked by the earlier naturalists, and still are by some. They have a distinct head, but there is no distinction of the other segments, as in insects, into thorax and abdomen. They have simple or compound eyes; a few are destitute of eyes. They have antennæ like those of insects. The mouth is furnished with a complex masticating apparatus, in some resembling that of some insects in a larval state, in others, similar to that of crustaceans. Respiration is carried on through minute pores or spiracles, placed on each side along the entire length of the body, the air being distributed by innumerable ramifying air-tubes to all parts. In most parts of their internal organisation the *M.* resemble insects; although a decided inferiority is exhibited, particularly in the less perfect concentration of the nervous system. The resemblance is greater to insects in their larval than in their perfect state. The body of the *M.* is protected by a hard cuticle.

ous covering. The number of segments is various, seldom fewer than 24; although in some of the higher genera they are consolidated together in pairs, so that each pair, unless closely examined, might be considered as one segment bearing two pairs of feet. The legs of some of the lower kinds, as *Julus* (q. v.), are very numerous, and may be regarded as intermediate between the bristle-like appendages which serve many annulids as organs of locomotion, and the distinctly articulated legs of insects. In the higher M., as *Scolopendra*, the legs are much fewer, and articulated like those of insects. None of the M. have wings. Some of them feed on decaying organic matter, chiefly vegetable; those of higher organisation are carnivorous. The M. do not undergo changes so great as those of insects, but emerge from the egg more similar to what they are ultimately to become; although some of them are at first quite destitute of feet; and, contrary to what takes place in insects, the body becomes more elongated as maturity is approached, the number of segments and of feet increasing.

The M. are divided into two orders: the lower, *Chilognatha* (*Julus*, &c.), having the body sub-cylindrical, the feet very numerous, the head rounded, the mandibles thick and strong; the higher, *Chilopoda* (*Scolopendra*, &c.), having the body flattened, the feet comparatively few, the head broad, the mandibles sharp and curved.

The M. are found in all parts of the world, in the ground, among moss, under stones, in the decaying bark of trees, in decaying roots, and in many similar situations. The largest species are tropical. They are all generally regarded with aversion. It is doubtful how far any of them are injurious to crops, although it is not improbable that they accelerate rottenness already begun; but some (Centipedes) have a venomous and painful bite.

MYRICA. See CANDLEBERRY.

MYRISTICÆÆ. See NUTMEG.

MYRISTIC ACID ( $C_{29}H_{47}O_3$ , HO) is a crystalline fatty acid, found in the seed of the common nutmeg, *Myristica moschata*. It occurs in the form of a glyceride in the fat of the nutmeg, or nutmeg butter. It has recently been found in small quantity amongst the products of the saponification of spermaceti, and of the fatty matter of milk; and hence this organic acid must be ranked amongst those which are common both to the animal and vegetable kingdoms.

MYRMECOPHAGA. See ANT-EATER.

MYROBALANS, the astringent fruit of certain species of *Terminalia*, trees of the natural order *Combretaceæ*, natives of the mountains of India. The genus *Terminalia* has a deciduous bell-shaped calyx and no corolla; the fruit is a juiceless drupe. *T. Belerica*, a species with alternate elliptical entire leaves, on long stalks, produces great part of the M. of commerce; but the fruits of other species often appear under the same name. Tonic properties are ascribed to M.; but although once in great repute, they are now scarcely used in medicine. They are used, however, by tanners and by dyers, and have therefore become a very considerable article of importation from India. They give a durable yellow color with alum, and, with the addition of iron, an excellent black.—*Emblie* M. are the fruit of *Emblica officinalis*, of the natural order *Euphorbiaceæ*, a native of India. They are used in India as a tonic and astringent; also in tanning and in the making of ink.—There is a kind of plum called the *Myrobalan Plum*. See PLUM.

MYRRH (Heb. *mur*), a gum resin produced by *Balsamodendron* (q. v.) *myrrha*, a tree of the natural order *Amyridaceæ*, growing in Arabia, and probably also in Abyssinia. The M. tree is small and scrubby, spiny, with whitish-gray bark, thinly-scattered small leaves, each consisting of three obovate obtusely toothletted leaflets, and the fruit a smooth brown ovate drupe, somewhat larger than a pea. M. exudes from the bark in oily yellowish drops, which gradually thicken and finally become hard, the color at the same time becoming darker. M. has been known and valued from the most ancient times; it is mentioned as an article of commerce in Gen. xxxvii. 25, and was amongst the presents which Jacob sent to the Egyptian ruler, and amongst those which the wise men from the East brought to the infant Jesus. It was an ingredient in the "holy anointing oil" of the Jews. M. appears in commerce either in tears and grains, or in pieces of irregular form and various sizes, yellow, red, or reddish brown. It is brittle, and has a waxy fracture, often exhibit-

**Myrsinaceæ**  
**Mysteris**

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ing whitish veins. Its smell is balsamic, its taste aromatic and bitter. It is used in medicine as a tonic and stimulant, in disorders of the digestive organs, excessive secretions from the mucous membranes, &c., also to cleanse foul ulcers and promote their healing, and as a dentifrice, particularly in a spongy or ulcerated condition of the gums. It was much used by the ancient Egyptians in embalming. The best *M.* is known in commerce as *Turkey M.*, being brought from Turkish ports; as the name *East Indian M.* is also given to *M.* brought to Europe from the East Indies, although it is not produced there, but comes from Abyssinia. It is not yet certainly known whether the *M.* tree of Abyssinia is the same as that of Arabia, or an allied species.

**MYRSINACEÆ**, a natural order of exogenous plants, consisting of trees and shrubs, natives chiefly of warm climates, and having simple leathery leaves, destitute of stipules; hermaphrodite or unisexual flowers, generally small, but often in umbels, corymba, or panicles; very similar in structure to the flowers of the *Primulacæ*; the fruit generally fleshy, with 1—4 seeds. The flowers are very often marked with sunken dots or glandular lines.—There are more than 300 known species. Many of them are beautiful evergreen shrubs, particularly the genus *Ardisia*. Some have peppery fruit, as *Embelia ribes*.

**MYRTACEÆ**, a natural order of exogenous plants, consisting of trees and shrubs, natives chiefly of warm, but partly also of temperate countries. The order, as defined by the greater number of botanists, includes several suborders, which are regarded by some as distinct orders, particularly **CHAMÆLAUCIACEÆ** (in which are contained about 50 known species, mostly beautiful little bushes, often with fragrant leaves, natives of New Holland), **BARRINGTONIACEÆ** (q. v.), and **LECYTHIDACEÆ** (q. v.). Even as restricted, by the separation of these, the order contains about 1300 known species. The leaves are entire, usually with pellucid dots, and a vein running parallel to and near their margin.—Some of the species are gigantic trees, as the *Eucalypti* or *Gum Trees* of New Holland, and different species of *Metrosideros*, of which one is found as far south as Lord Auckland's Islands, in lat. 50½°. The timber is generally compact.—Astringency seems to be rather a prevalent property in the order, and the leaves or other parts of some species are used in medicine as astringents and tonics. A fragrant or pungent volatile oil is often present in considerable quantity, of which *Oil of Capeput* and *Oil of Cloves* are examples. *Cloves* and *Pimento* are amongst the best known products of the order. The berries of several species are occasionally used as spices in the same way as the true Pimento. A considerable number yield pleasant edible fruits, among which are the **POMEGANATE**, the **GUAVA**, species of the genus *Eugenia*, and some species of myrtle.

**MYRTLE** (*Myrtus*) a genus of *Myrtaceæ*, having the limb of the calyx 4—5 parted, 4—5 petals, numerous free stamens, and almost globose germen, and a 2—3 celled berry, crowned with the limb of the calyx, and containing kidney-shaped seeds. The leaves are opposite and marked with pellucid dots; the flower-stalks are axillary, and generally one-flowered. The **COMMON M.** (*M. communis*) is well known as a beautiful evergreen shrub, or a tree of moderate size, with white flowers. It is a native of all the countries around the Mediterranean Sea, and of the temperate parts of Asia, often forming thickets, which sometimes occur even within the reach of the sea-spray. The leaves are ovate or lanceolate, varying much in breadth. They are astringent and aromatic, containing a volatile oil, and were used in medicine by the ancients as a stimulant. The berries are also aromatic, and are used in medicine in Greece and India. A *M.* wine, called *Myrtidatum*, is made in Tuscany. *M.* bark is used for tanning in many parts of the south of Europe. Among the ancient Greeks, the *M.* was sacred to Venus, as the symbol of youth and beauty, was much used in festivals, and was, as it still is, often mentioned in poetry. The *M.* endures the winters of Britain only in the mildest situations in the south.—The **SMALL-LEAVED M.** of Peru (*M. microphylla*) has red berries of the size of a pea, of a pleasant flavor and sugary sweetness. Those of the **LUMA** (*M. luma*) are also palatable, and are eaten in Chili; as are those of the **DOWNY M.** (*M. tomentosa*), on the Netherberry Hills; and those of the **WHITE-BERRIED M.** (*M. leucocarpa*), by some regarded as a variety of the Common *M.*, in Greece and Syria. The berries of this species or variety are larger than those of the Common *M.*, and have a very

pleasant taste and smell.—A very humble species of *M. (M. nummularia)* spreads over the ground in the Falkland Islands, as thyme does in Britain.

MYRTLE-WAX. See WAX.

MY'SIS, a genus of podothalmons (stalk-eyed) crustaceans, of the order *Stomatopoda*, much resembling the common shrimps in form, although differing from them in the external position of the gills. They are often called *Opossum Shrimps*, because the last two feet are furnished with an appendage, which in the female forms a large pouch, and in this the eggs are received after they leave the ovary, and are retained till the young acquire a form very similar to that of the parent, when the whole brood are at once set free into the ocean. Species of *M.* are found on the British shores, but they are far more abundant in the Arctic seas, where they form no small part of the food of whales, and of many fishes, particularly of different species of salmon.

MYSO'RE, or Maisur, a raj or principality of Southern India, under the protection of the British government, in lat.  $11^{\circ} 35'$ — $15^{\circ}$  n., and in long.  $74^{\circ} 45'$ — $78^{\circ} 45'$  e. It is bounded on the n. by the British collectorate of Dharwar, and otherwise surrounded by districts belonging to the Madras presidency. The area is 27,000 square miles; the pop. in 1871—1872 was 5,055,412. *M.* is an extensive table-land, with an average elevation of about 2000 feet, and with a slope principally toward the north and north-east. The chief rivers are the Cauvery, flowing south-east, and the Tungabhadra, the Mugri, and the Pennar flowing north and north-east. The climate of the higher districts is during a great portion of the year healthy and pleasant. In 1871—1872, the value of the exports, which consist of betel-nut, coffee, cotton, cardamoms, rice, silk, and sugar, amounted to £1,100,000. The imports, consisting mainly of iron, gold, pepper, salt, and pulses, were £1,070,000. Since 1832, the control of the country has been entirely in the hands of the English, and the government is administered by a British commissioner. Chief town, Mysore. For the history of *M.*, see articles HYDER ALI, TIPPOO SAHIB, and INDIA.

MYSO'RE, or Maisur, a city of India, the seat of a British residency, capital of the territory, and of the subdivision of the same name, is situated amid picturesque scenery on a declivity formed by two parallel ranges of elevated ground running north and south, 245 miles west-south-west of Madras, lat.  $12^{\circ} 19'$  n., long.,  $76^{\circ} 43'$  e. The houses are generally built of teak, and among the chief edifices are the British residency and church. The fort is quadrangular in form, three of its sides being 450 yards in length, and the remaining side longer. The rajah's palace, occupying three sides of the interior fort, contains a magnificent chair or throne of gold. The climate is mild, but not healthy; fevers are of frequent occurrence. Carpets are manufactured. Pop. (1872) 57,765.

MY'STAGOGUE (Gr. *mystes*, an initiated person, and *ago*, I lead), the name in the Greek religious system of the priest whose duty it was to direct the preparations of the candidates for initiation in the several mysteries, as well as to conduct the ceremonial of initiation. It was sometimes applied by a sort of analogy to the class of professional *ciceroni*, who in ancient, as still in modern times, undertook to shew to strangers newly arrived in a city the noteworthy objects which it contained; but the former meaning is its primitive one, and formed the ground of the application of the same name in the Christian church, to the catechists or other clergy who prepared candidates for the Christian *mysterics*, or sacraments, of baptism, confirmation, and the eucharist, especially the last. In this sense, the word is constantly used by the fathers of the 4th and 5th centuries; and in the well-known lectures of St Cyril of Jerusalem, although all were addressed to candidates for the *mysterics*, some for baptism, and some for the eucharist, it is only to the lectures addressed to the latter that the name *mystagogic* is applied. This distinction was connected with the well-known Discipline of the Secret; and it appears to have ceased with the abolition or gradual disuse of that discipline.

MYSTERIES (Gr. from *muo*, to close the lips or eyes), also called *Teletai*, *Orgia*, or, in Latin, *Initia*, designate certain rites and ceremonies in ancient, chiefly Greek and Roman religions, only known to, and practised by, congregations of certain

initiated men and women, at appointed seasons, and in strict seclusion. The origin, as well as the real purport of these mysteries, which take no unimportant place among the religious festivals of the classical period, and which, in their ever-changing nature, designate various phases of religious development in the antique world, is all but unknown. It does seem, indeed, as if the vague speculations of modern times on the subject were an echo of the manifold interpretations of the various acts of the mysteries given by the priests to the inquiring disciple—according to the lights of the former or the latter. Some investigators, themselves not entirely free from certain mystic influences (like Cruizer and others), have held them to have been a kind of misty orb around a kernel of pure light, the bright rays of which were too strong for the eyes of the multitude; that, in fact, they hid under an outward garb of mummery a certain portion of the real and eternal truth of religion, the knowledge of which had been derived from some primeval, or, perhaps, the Mosaic revelation; if it could not be traced to certain (or uncertain) Egyptian, Indian, or generally Eastern sources. To this kind of hazy talk, however (which we only mention because it is still repeated every now and then), the real and thorough investigations begun by Lobeck, and still pursued by many competent scholars in our own day, have, or ought to have, put an end. There cannot be anything more alien to the whole spirit of Greek and Roman antiquity than a hiding of abstract truths and occult wisdom under rites and formulas, songs and dances; and, in fact, the mysteries were anything but exclusive, either with respect to sex, age, or rank, in point of initiation. It was only the speculative tendency of later times, when Polytheism was on the wane, that tried to symbolise and allegorise these obscure, and partly imported ceremonies, the bulk of which had undoubtedly sprung from the midst of the Pelasgian tribes themselves in prehistoric times, and which were intended to represent and to celebrate certain natural phenomena in the visible creation. There is certainly no reason to deny that some more refined minds may at a very early period have endeavored to impart a higher sense to these wondrous performances; but these can only be considered as solitary instances. The very fact of their having to be put down in later days as public nuisances in Rome herself, speaks volumes against the occult wisdom inculcated in secret assemblies of men and women.

The mysteries, as such, consisted of purifications, sacrificial offerings, processions, songs, dances, dramatic performances, and the like. The mystic formulas (*Draknumena*, *Dromena*, *Legomena*, the latter including the Liturgies, &c.) were held deep secrets, and could only be communicated to those who had passed the last stage of preparation in the mystagogue's hand. The hold which the nightly secrecy of these meetings, together with their extraordinary worship, must naturally have taken upon minds more fresh and childlike than our advanced ages can boast of, was increased by all the mechanical contrivances of the effects of light and sound which the priests could command. Mysterious voices were heard singing, whispering, and sighing all around, lights gleamed in manifold colors from above and below, figures appeared and disappeared; the mimic, the tonic, the plastic—all the arts, in fact, were taxed to their very utmost to make these performances (the nearest approach to which, in this country, is furnished by transformation-scenes, or sensation-dramas in general) as attractive and profitable (to the priests) as could be. As far as we have any knowledge of the plots of these mysteries as scenic representations, they generally brought the stories of the special gods or goddesses before the spectator—their births, sufferings, deaths, and resurrections. Many were the outward symbols used, of which such as the Phallus, the Thyrus, Flower Baskets, Mystic Boxes, in connection with special deities, told more or less their own tale, although the meanings supplied by later ages, from the Neo-platonists to our own day, are various, and often very amazing. The most important mysteries were, in historical times, those of Eleusis and the Thesmophorian, both representing—each from a different point of view—the rape of Proserpina, and Ceres's search for her: the Thesmophorian mysteries being also in a manner connected with the Dionysian worship. There were further those of Zeus of Crete—derived from a very remote period—of Bacchus himself, of Cybele, and Aphrodite—the two latter with reference to the Mystery of Propagation, but celebrated in diametrically opposed ways, the former culminating in the self-mutilation of the worshipper, the latter in prostitution. Further, the Mysteries of Orpheus, who in a certain degree was considered the founder of all mysteries. Nor were the other gods and goddesses forgotten:

Hera, Minerva, Diana, Hecate, nay, foreign gods like Mithras (q. v.), and the like, had their due secret solemnities all over the classical soil, and whithersoever Greek (and partly Roman) colonists took their Lares and Penates all over the antiquo world. The beginning of the reaction in the minds of thinking men, against this mostly gross and degenerated kind of veneration of natural powers and instincts, is marked by the period of the Hesiodic poems; and when towards the end of the classical periods, the mysteries were no longer secret, but public orgies of the most shameless kind, their days were numbered. The most subtle metaphysicians, allegorists and symbolists as they might, failed in reviving them, and in restoring them to whatever primeval dignity there might have once been inherent in them.

MYSTERIES AND MIRACLE-PLAYS were dramas founded on the historical parts of the Old and New Testaments, and the lives of the saints, performed during the middle ages, first in churches, and afterwards in the streets on fixed or movable stages. Mysteries were properly taken from biblical and miracle-plays from legendary subjects, but this distinction in nomenclature was not always strictly adhered to. We have an extant specimen of the religious play of a date prior to the beginning of the middle ages in the *Christos Paschou*, assigned, somewhat questionably, to Gregory Nazianzen, and written in 4th c. Greek. Next come six Latin plays on subjects connected with the lives of the saints, by Roswitha, a nun of Gandersheim, in Saxony, which, though not very artistically constructed, possess considerable dramatic power and interest; they have been lately published at Paris, with a French translation. The performers were at first the clergy and choristers, afterwards any layman might participate. The earliest recorded performance of a miracle-play took place in England. Matthew Paris relates that Geoffroy, afterwards Abbot of St Albans, while a secular, exhibited at Dunstable the miracle-play of St Catherine and borrowed copes from St Albans to dress his characters. This must have been at the end of the 11th or beginning of the 12th century. Fitzstephen, in his "*Life of Thomas à Becket*" 1188 A. D., describe with approval the representation in London of the sufferings of the saints and miracles of the confessors. On the establishment of the *Corpus Christi* festival by Pope Urban IV. in 1264, miracle-plays became one of its adjuncts, and every considerable town had a fraternity for their performance. Throughout the 15th and following centuries, they continued in full force in England, and are mentioned, sometimes approvingly, sometimes disapprovingly, by contemporary writers. Designed at first as a means of religious instruction for the people, they had long before the Reformation so far departed from their original character, as to be mixed up in many instances with buffoonery and irreverence, intentional or unintentional, and to be the means of inducing contempt rather than respect for the church and religion. Remarkable collections exist of English mysteries and miracles of the 15th c., known as the Chester, the Coventry, and the Towneley plays. The first two have been published by the Shakespeare Society, and the other by the Surtees Society. The Towneley mysteries are full of the burlesque element, and contain many curious illustrations of contemporary manners.

Out of the mysteries and miracle-plays sprang a third class of religious plays called "*Moralities*," in which allegorical personifications of the Virtues and Vices were introduced as *dramatis personae*. These personages at first only took part in the play along with the scriptural or legendary characters, but afterwards entirely superseded them. The oldest known English compositions of this kind are of the time of Henry VI.; they are more elaborate and less interesting than the miracle plays. Moralities continued in fashion till the time of Elizabeth, and were the immediate precursors of the regular drama.

Miracles and mysteries were as popular in France, Germany, Spain, and Italy as in England. A piece of the kind yet extant, composed in France in the 11th c., is entitled the "*Mystery of the Wise and Foolish Virgins*," and written partly in the Provincial dialect and partly in Latin. A celebrated fraternity, called the *Confrérie de la Passion*, founded in Paris in 1350, had a monopoly for the performance of mysteries and miracle-plays, which were of such a length, that the exhibition of each occupied several days. A large number of the French mysteries of the 14th c. are extant. In the alpine districts of Germany, miracle-plays were composed and acted by the peasants; these peasant-plays had less regularity in their dramatic form,

were often interspersed with songs and processions; and in their union of simplicity with high-wrought feeling were most characteristic of the people in whom the religious and dramatic element are both so largely developed. In the early part of last century, they began to partake to a limited extent of the burlesque, which had brought miracle-plays into disrepute elsewhere.

It is a mistake to suppose that the hostility of the reformers was what suppressed these exhibitions. The fathers of the Reformation shewed no unfriendly feeling towards them. Luther is reported to have said that they often did more good and produced more impression than sermons. The most direct encouragement was given to them by the founders of the Swedish Protestant Church, and by the earlier Lutheran bishops, Swedish and Danish. The authorship of one drama of the kind is assigned to Grotius. In England, the greatest check they received was from the rise of the secular drama; yet they continued to be occasionally performed in the times of James I. and Charles I., and it is well known that the first sketch of Milton's "Paradise Lost" was a sacred drama, where the opening speech was Satan's Address to the Sun. A degenerate relic of the miracle-play may yet be traced in some remote districts of England, where the story of St George, the dragon, and Beelzebub, is rudely represented by the peasantry. Strange to say, it was in the Catholic south of Germany, where these miracle-plays and mysteries had preserved most of their old religious character, that the severest blow was levelled against them. Even there, they had begun to be tainted to a limited extent with the burlesque element, which had brought them into disrepute elsewhere. In 1779, a manifesto was issued by the Prince-archbishop of Salzburg, condemning them, and prohibiting their performance, on the ground of their ludicrous mixture of the sacred and the profane, the frequent bad acting in the serious parts, the distraction of the lower orders from more edifying modes of instruction, and the scandal arising from the exposure of sacred subjects to the ridicule of free-thinkers. This ecclesiastical denunciation was followed by vigorous measures on the part of the civil authorities in Austria and Bavaria. One exception was made to the general suppression. In 1633, the villagers of Oberammergau, in the Bavarian highlands, on the cessation of a plague which desolated the surrounding country, had vowed to perform every tenth year the Passion of Our Saviour, out of gratitude, and as a means of religious instruction; a vow which had ever since been regularly observed. The pleading of a deputation of Ammergau peasants with Max. Joseph of Bavaria saved their mystery from the general condemnation, on condition of everything that could offend good taste being expunged. It was then and afterwards somewhat remodelled, and is perhaps the only mystery or miracle-play which has survived to the present day. The last performance took place in 1870. The inhabitants of this secluded village, long noted for their skill in carving in wood and ivory, have a rare union of artistic cultivation with perfect simplicity. Their familiarity with sacred subjects is even beyond what is usual in the alpine part of Germany, and the spectacle seems still to be looked on with feelings much like those with which it was originally conceived. What would elsewhere appear impious, is to the alpine peasants devout and edifying. The personator of Christ considers his part an act of religious worship; he and the other principal performers are said to be selected for their holy life, and consecrated to their work with prayer. The players, about 500 in number, are exclusively the villagers, who, though they have no artistic instruction except from the parish priest, act their parts with no little dramatic power, and a delicate appreciation of character. The New Testament narrative is strictly adhered to, the only legendary addition to it being the St Veronica handkerchief. The acts alternate with *tableaux* from the Old Testament and choral odes. Many thousands of the peasantry are attracted by the spectacle from all parts of the Tyrol and Bavaria, among whom the same earnest and devout demeanor prevails as among the performers. Plays of a humbler description, from subjects in legendary or sacred history, are not unfrequently got up by the villagers around Innsbruck, which shew a certain rude dramatic talent, though not comparable to what is exhibited at Ammergau. Girls very generally represent both the male and female characters.

**MYSTICISM** (Gr. *mystikos*, mystical), a term used with considerable vagueness, but implying that general tendency in religion to higher and more intimate communion with the Divine, to which, in most religions, ancient and modern, certain individuals or classes have laid claim. In the Platonic philosophy, and in the Eastern sys-

tems, from which that philosophy is derived, the human soul being regarded as a portion of the divine nature, it is held to be the great end of life to free the soul from the embarrassment and mental darkness in which it is held by the material trammels of the body in which it is imprisoned. In the pursuit of this end, two very opposite courses were adopted: the first, that of spiritual purification, partly by repressing the natural appetites and weakening the sensual impulses by corporeal austerities, partly by elevating the soul through intense contemplation and withdrawal from the outward objects of sense; the other, that of regarding the soul as superior to the body, independent of its animal impulses, incapable, from its higher origin, of being affected by its outward actions, or sullied by contact with the corruption in which its lower nature might love to wallow. A similar element of M., which, in truth, must form in some sense, a constituent of every religious system, is traceable in the early doctrinal history of Christianity, and the career of Christian M. also divides itself into the same twofold course. Among the early sects external to the church, we trace the first in the system of Tatian and of the Encratites, while the second finds its parallel in the Syrian Gnostics, in Carpocrates, Bardesanes, and in one form at least of the Nicolaitic heresy. Within the Christian church there never has been wanting a continuous manifestation of the mystical element. The language of St Paul in Gal. ii. 20, and in 2d Cor. xii. 2, and many expressions in the Apocalypse, may be taken as the exponents of Christian M., the highest aspiration of which has ever been towards that state in which the Christian "no longer liveth, but Christ liveth in him." And although no regular scheme of M. can be found in the early Fathers, yet the writings of Hermes the Shepherd, the Epistles of St Ignatius, the works of St Clement of Alexandria, the Expositions of Origen, and above all, the Confessions of St Augustine, abound with outpourings of the true spirit of Christian mysticism. It is curious that the first systematic exposition of its principles is said to be in the works of the pseudo-Dionysius the Areopagite; but it was not till the days of the Scholastics that it received its full development, when the mystic life was resolved into its three stages, viz., of Purification, of Illumination, and of Ecstatic Union with God and Absorption in Divine Contemplation. It was upon the explanation of this third stage that the great division of the mediæval mystic schools mainly turned; some of them explaining the union with God in a pantheistic or semipantheistic sense, and thereby annihilating the individual will, and almost the personal action of man in the state of ecstasy; others, with St Bernard, fully preserving both the individuality and the freedom of man, even in the highest spiritual communication with his Creator. Of the former, many, as the Hesychasts (q. v.) in the Greek Church, and the Brethren of the Free Spirit (q. v.) and the Beghards in the Latin, drew from these mystical doctrines the most revolting moral consequences; in others, as Tauler, Ruysbroek, Ekkart, the error does not seem to have gone beyond the sphere of speculation. The writings of Thomas à Kempis (q. v.), of St Catherine of Siena, of St John of the Cross, and of St Teresa, may perhaps be taken as the most characteristic representations of the more modern form of the traditional M. which has come down from the mystics of the middle ages.

The later history of M. in the Roman Catholic Church will be found under the heads of FENELON, MADAME GUYON, MOLINOS, and QUIETISM. The most remarkable followers of the same or kindred doctrines in the Protestant communions are Jacob Böhme (q. v.) of Görlitz, Emmanuel Swedenborg (q. v.), and the celebrated William Law (q. v.).

**MYTH AND MYTHOLOGY.** The word *myth* (Gr. *mythos*), originally signified *speech or discourse*, and was identical with the word *logos*. After the age of Pindar and Herodotus, however, it came to be synonymous with the Latin word *fabula*, *fable*, or *legend*. According to the present use of our language, a myth is an idea or fancy presented in the historical form; and though, of course, any fiction at any time in this shape might be called a myth, yet by usage the word is confined to those fictions made in the early periods of a people's existence, for the purpose of representing their religious belief, and generally their oldest traditions, in an attractive form. The tendency to create myths in this way seems inherent in every people; certainly there is no people so sunk into the brute as to be without them. A myth is not to be confounded with an allegory; the one being an unconscious act of the popular mind at an early stage of society, the other a conscious act of the individual



mind at any stage of social progress. The parables of the New Testament are allegorical; so are *Æsop's Fables*; no one mistakes them for realities; they are known to have been invented for a special didactic purpose, and so received. But the peculiarity of myths is, that they are not only conceived in the narrative form, but generally taken for real narrations by the people to whom they belong, so long at least as they do not pass a certain stage of intellectual culture. Even myths of which the allegorical significance is pretty plain, such as the well-known Greek myth of Prometheus and Epimetheus, were received as facts of early tradition by the Greek. Myths may be divided into several classes, of which the first and most important is the theological and moral. The oldest theology of all nations is in the form of myths; hence the great importance of mythological study, now universally recognised; for it is not occupied merely or mainly with strange fancies and marvellous fictions, invented for the sake of amusement, but contains the fundamental ideas belonging to the moral and religious nature of man as they have been embodied by the imaginative faculty of the most favored races. It is this dominance of the imagination, so characteristic of the early stages of society, which gives to myth its peculiar dramatic expression, and stamps the popular creed of all nations with the character of a poetry of nature, of man, and of God. From the very nature of the case, the myth-producing faculty exercises itself with exuberance only under the polytheistic form of religion; for there only does a sufficient number of celestial personages exist, whose attributes and actions may be exhibited in a narrative form; there is nothing, however, to prevent even a monotheistic people from exhibiting certain great ideas of their faith in a narrative form, so as by prosaic minds to be taken for literal historical facts. But besides strictly theological myths, there are physical myths, that is, fictions representing the most striking appearances and changes of external nature in the form of poetical history; in which view, the connection of legends about giants, chimeras, &c., with regions marked by peculiar volcanic phenomena, has been often remarked. It is difficult indeed, in polytheistic religions, to draw any strict line between physical and theological myths; as the divinity of all the operations of nature is the first postulate of polytheism, and every physical phenomenon becomes the manifestation of a god. Again, though it may appear a contradiction, there are historical myths; that is, marvellous legends about persons, who may with probability be supposed to have actually existed. So intermingled, indeed, is fact with fable in early times, that there must always be a kind of debatable land between plain theological myth and recognised historical fact. This land is occupied by what are called the heroic myths; that is, legends about heroes, concerning whom it may often be doubtful whether they are merely a sort of inferior, and more human-like gods, or only men of more than ordinary powers whom the popular imagination has elevated into demi-gods.

The scientific study of mythology commenced with the ancient nations who produced it, specially with the acute and speculative Greeks. The great mass of the Greek people, indeed—of whom we have a characteristic type in the traveller Pausanias—accepted their oldest legends, in the mass, as divine and human facts; but so early as the time of Euripides, or even before his day in the case of the Sicilians, Epicharmus and Empedocles, we find that philosophers and poets had begun to identify Jove with the upper sky, Apollo with the sun, Juno with the nether atmosphere, and so forth; that is, they interpreted their mythology as a theology and poetry of nature. This, indeed, may be regarded as the prevalent view among all the more reflective and philosophical heathens (who were not, like Xenophon, orthodox believers) up from the age of Pericles, 450 B. C., to the establishment of Christianity. But there was an altogether opposite view, which arose at a later period, under less genial circumstances, and exercised no small influence both on Greek and Roman writers. This view was first prominently put forth by Euhemerus, a Messenian, in the time of the first Ptolemies, and consisted in the flat prosaic assertion, that the gods, equally with the heroes, were originally men, and all the tales about them only human facts sublimed and elevated by the imagination of pious devotees. This view seemed to derive strong support from the known stories about the birth and death of the gods, specially of Jove in Crete; and the growing sceptical tendencies of the scientific school at Alexandria, were of course favorable to the promulgation of such views. The work of Eue-

myths accordingly obtained a wide circulation; and having been translated into Latin, went to nourish that crass form of religious scepticism which was one of the most notable symptoms of the decline of Roman genius at the time of the emperors. Historians, like Diodorus, gladly adopted an interpretation of the popular mythology which promised to swell their stores of reliable material; the myths accordingly were coolly emptied of the poetic soul which inspired them, and the early traditions of the heroic ages were set forth as plain history, with a grave sobriety equally opposed to sound criticism, natural poetry, and good taste.

In modern times the Greek mythology has again formed the basis of much speculation on the character of myths and the general laws of mythical interpretation. The first tendency of modern Christian scholars, following the track long before taken by the fathers, was to refer all Greek mythology to a corruption of Old Testament doctrine and history. Of this system of interpreting myths, we have examples in Vossius, in the learned and fanciful works of Bryant and Faber, and very recently, though with more pious and poetic feeling, in Gladstone. But the Germans, who have taken the lead here, as in other regions of combined research and speculation, have long ago given up this ground as untenable, and have introduced the rational method of interpreting every system of myths, in the first place according to the peculiar laws traceable in its own genius and growth. Ground was broken in this department by Heyne, whose views have been tested, corrected, and enlarged by a great number of learned, ingenious, and philosophical writers among his own countrymen, especially by Buttmann, Voss, Creuzer, Müller, Welcker, Gerhardt, and Preller. The general tendency of the Germans is to start—as Wordsworth does in his “Excursion,” book iv.—from the position of a devout imaginative contemplation of nature, in which the myths originated, and to trace the working out of those ideas, in different places and at different times, with the most critical research, and the most vivid reconstruction. If in this work they have given birth to a large mass of ingenious nonsense and brilliant guess-work, there has not been wanting among them abundance of sober judgment and sound sense to counteract such extravagances. It may be noticed however, as characteristic of their over-speculative intellect, that they have a tendency to bring the sway of theological and physical symbols down into a region of what appears to be plain historical fact; so that Achilles becomes a water-god, Peleus, a mud-god, and the whole of the “Iliad,” according to Forchhammer, a poetical geology of Thessaly and the Troad! Going to the opposite extreme from Euhemerus, they have denied the existence even of deified heroes; all the heroes of Greek tradition, according to Uschold, are only degraded gods; and generally in German writers, a preference of transcendental to simple and obvious explanations of myths is noticeable. Creuzer, some of whose views had been anticipated by Blackwell, in Scotland, is especially remarkable for the high ground of religious and philosophical conception on which he has placed the interpretation of myths; and he was also the first who directed attention to the oriental element in Greek mythology—not, indeed, with sufficient discrimination in many cases, but to the great enrichment of mythological material, and the enlargement of philosophical survey. In the most recent times, by uniting the excursive method of Creuzer with the correction supplied by the more critical method of O. Müller and his successors, the science of comparative mythology has been launched into existence; and specially the comparison of the earliest Greek mythology with the sacred legends of the Hindus, has been ably advocated by Max Müller in the “Oxford Essays” (1856). In France, the views of Euhemerus were propounded by Banier (1739). By the British scholars, mythology is a field that has been very scantily cultivated. Besides those already named, Payne Knight, Mackay, Grote in the first volumes of his history, and Keightley are the only names of any note, and their works can in no wise compete in originality, extent of research, in discriminating criticism, or in largeness of view, with the productions of the German school. The best for common purposes is Keightley; the most original, Payne Knight. Recently, G. W. Cox, in a work on Aryan mythology, has pushed the Sanscritising tendencies of Max Müller to an extreme which to most minds seems absurd. On the special mythologies of India, Rome, Greece, &c., information will be found under the heads of the respective countries to which they belong. The more important mythological personages are noticed under their own names; see BACCHUS, JUPITER, HERCULES, &c.

N  
Nævis

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## N

**N**, the fourteenth letter of the English alphabet, is one of the nasal liquids of the Rûgual class. See **LETTERS**. Its Hebrew (and Phœnician) name, *Nun*, signified a *fish*, which its original form was probably meant to represent. **N** is interchangeable with **L** (q. v.) and **M**, as in *collect*, *commingle*, *confer*; and in Ger. *boden*, compared with Eng. *bottom*. In Latin, this letter had a faint, uncertain sound at the end of words and in some other positions, especially before *s*. This accounts for words in *on* having lost the *n* in the nominative case, though retaining it in the oblique cases, as *homo*, *hominis*; and for Greek names like *Platon* being written without the final *n* in Latin. The dull, muffled pronunciation of *n*, which is indicated by such words as *consul*, *censor*, *testamento*, being frequently spelled *conul*, *cesor*, *testamelo*, was the first stage of the modern French nasal *a*. Before a guttural letter, *n* naturally assumes the sound of *ng*, as *bank*.

**NAAS**, a market and assize town of Kildare County, Ireland, 20½ miles south-west of Dublin, and, next to Athy, the largest town in the county. The population in 1871 was 3660. The principal street is about half a mile in length; the county court-house is in the main street. Having been anciently the seat of the kings of Leinster, **N** was early occupied by the English. A parliament was held in it in 1419, and it obtained charters successively from Henry V., Elizabeth, and James I. At present, **N** is a place of little trade, and is almost entirely without manufactures. It returned two members to the Irish parliament, but was disfranchised at the Union. It is the seat of a diocesan school, and of three national schools, one of which is attached to the Roman Catholic convent. A newspaper, printed at Maryborough, is also published here.

**NA'BOB**, or **Nabab**, a corruption of the word *Nawâb* (deputy), was the title belonging to the administrators, under the Mogul empire, of the separate provinces into which the district of a *Subahdar* (q. v.) was divided. The title was continued under the British rule, but it gradually came to be applied generally to natives who were men of wealth and consideration. In Europe, and especially in Britain, it is applied derisively to those who, having made great fortunes in the Indies, return to their native country, where they live in oriental splendor.

**NABONA'SSAR**, Era of, was the starting-point of Babylonian chronology, and was adopted by the Greeks of Alexandria, Berossus and others. It began with the accession of Nabonassar to the throne—an event calculated (from certain astronomical phenomena recorded by Ptolemy) to have taken place 26th February 747 B.C.

**NÂBULU'S**, or **Nâblu's** (a corruption of the Gr. *Neapolis*, New City, the name given to it in the reign of Vespasian), anciently called **SHËCHEM** or **SICHEM**, in the New Testament (John iv. 5), **SYCHAR**; is a town of Palestine, possessing, it is said, "the only beautiful site from Dan to Beersheba." It lies between Mount Ebal and Mount Gerizim, on the south side of the valley of Erd-Mâkhna, and has a population variously estimated at from 8000 to 14,000, of whom about 600 are Christians, 150 Samaritans, and 50 Jews; the rest are Mohammedans, fierce, turbulent, and fanatical. The houses are pretty good, but the streets (as usual in the East) are narrow, gloomy, and filthy. The chief productions are soap, cotton, and oil—the soap-manufactories are large, and the oil is considered the best in Syria.—See Porter's "Hand-book for Syria and Palestine," and Stanley's "Palestine."

**NACRE**. See **MOTHER OF PEARL**.

**NADIR**, an Arabic word signifying that point in the heavens which is diametrically opposite to the zenith, so that the zenith, nadir, and centre of the earth are in one straight line. The zenith and nadir form the poles of the Horizon (q. v.). See **ZENITH**.

**NADIR SHAH**, of Persia, belonged to the Afshars, a Turkish tribe, and was born near Kelat, in the centre of Khorassan, Persia, in 1688. When 17 years old, he was taken prisoner by the Usbeks, but escaped after four years of captivity; entered the service of the governor of Khorassan, and soon obtained high promotion. Having, however, been degraded and punished for some real or supposed offence, he betook himself to a lawless life, and for several years was the daring leader of a band of 3000 robbers, who levied contributions from almost the whole of Khorassan. An opportunity having occurred, N. seized the town of Kelat, and gradually extended his territorial authority. Persia was at this time ruled by Melek Ashraf, an Afghan of the tribe of Ghilji, whose grinding tyranny and cruelty produced in the mind of every Persian a deadly hatred of the very name Afghan, which exists to the present day. N. having avowed his intention of expelling the hated race from the country and restoring the Saffavean dynasty, numbers flocked to his standard, and Meshed, Herat, and all Khorassan were speedily reduced. Ashraf, signally defeated in several engagements, fled before the avenger, who, with a celerity only equalled by its thoroughness, purged the provinces of Irak, Fars, and Kerman of even the semblance of Afghan domination. The assassination of Ashraf, during his retreat, terminated the war. The rightful heir, Tamasp, then ascended the throne, and N. received for his services the government of the provinces of Khorassan, Mazanderan, Seistan, and Kerman, assuming at the same time the title of Tamasp-kuli (the Slave of Tamasp), the title of khan being subsequently added. He was sent against the Turks in 1731, and defeated them at Hamadan, regaining the Armenian provinces which had been seized by the Turks in the preceding reign; but his sovereign having in his absence engaged unsuccessfully the same enemy, N. caused him to be put in prison, and elevated his infant son, Abbas III., to the throne in 1732. The death of this puppet, in 1736, opened the way for the elevation of N. himself, who was crowned as *Nadir Shah*, February 26, 1736. He resumed the war with the Turks; and though totally defeated in the first two battles by the Grand Vizier Asiman, turned the tide of fortune in the subsequent campaign, and granted peace to the Turks on condition of receiving Georgia. He also conquered Afghanistan, and drove back the invading Usbeks. His ambassador to the Great Mogul having been murdered along with all his suite at Jelalabad, and satisfaction having been refused, N. in revenge ravaged the North-west Provinces, and took Delhi, which he was, by the insane behavior of the inhabitants, reduced to the necessity of pillaging. With booty to the amount of £20,000,000, including the Koh-i-nûr (q. v.) diamond, he returned to the west bank of the Indus. He next reduced Bokhara and Kharezm, restoring to Persia her limits under the golden reign of the Sassanides. From this period, his character underwent a sudden change: he was formerly open-hearted, liberal, and tolerant; he now became suspicious, avaricious, and tyrannical. The empire groaned under his extortions, and he was finally assassinated on the 20th June 1747. His only surviving son was carried to Constantinople, and thence to Vienna, where he was brought up as a Catholic, under the surveillance of the Empress Maria Theresa, and died a major in the Austrian service, under the title of Baron Semlin. N.'s tyranny has now been forgotten; and at the present day, he is regarded with pride and gratitude as the "Wallace" of Persia.

**NÆVIUS**, Cn., one of the earliest Latin poets, was born, probably in Campania, in the first half of the 3d c. B. C. In his youth, he served in the first Punic war; but about the year 235 B. C., he made his appearance at Rome as a dramatic writer. Of his life, we know little; but of his character, rather more. He was very decidedly attached to the plebeian party; and in his plays, satirised and lampooned the Roman nobles with all the virulence and indiscretion of a hot-blooded impetuous Campanian—that Gascon of ancient Italy! His rashness ultimately caused his banishment to Utica in Africa, where he died, 204 or 202 B. C. Besides his dramatic writings, comprising both tragedies and comedies, he wrote an epic poem, "De Bello Punico," in the old Saturnian metre. Of these, only a few very unimportant fragments are extant, which may be found in Bothe's "Poetarum Latiorum Scenici

corum Fragmenta" (Halberstadt, 1824); or Klunmann's collection of the same (Jena, 1843), enriched by a life of N., and an essay on his poetry. See also Sellars's "Poets of the Roman Republic" (Edin. 1863).

**NÆVUS** (known practically as *mother-spot* or mole) is a congenital mark or growth on a part of the skin. Sometimes it is merely a dark discoloration of the surface as described in the article **MACULÆ**, in which case it is termed a mole and is perfectly harmless; but often it consists of a dense network of dilated blood-vessels, forming a reddish or livid tumor, more or less elevated above the surface of the surrounding skin. The most frequent situations of these vascular nevi are the skin and subcutaneous cellular tissue of the head; but they may occur elsewhere. The popular belief is, that they are caused by the longing of the mother during her pregnancy for a lobster, or strawberry or raspberry, or some other red-colored article of food, and that the influence of her mind has impressed upon the fœtus a more or less vivid image of the thing she longed for; and hence the name of *mother-spot*. Sometimes these tumors waste away spontaneously, and give no trouble; but frequently they increase rapidly, invade the adjacent tissues, and ulcerate or slough, and thus become dangerous to life by hæmorrhage. When these tumors do not shew a tendency to increase, no treatment is necessary. When they are obviously increasing in size, the continual application of cold (by means of freezing mixtures), with moderately firm pressure, is sometimes of service; but a more certain method is to employ means to produce such an amount of inflammation as to obliterate the vessels; for this purpose, the seton, the application of nitric acid, and vaccination of the tumor, have been successfully applied. The injection of strong astringents, with the view of coagulating the blood, has sometimes effected a cure. If all those means fail, extirpation, either with the ligature or knife, must be resorted to; the ligature being regarded as the safest and best method. For the various methods of applying the ligature, the reader is referred to any standard work on operative surgery. If the tumor is in an inaccessible spot, as in the orbit of the eye, and is increasing rapidly, the only course is to tie the large vascular trunk supplying it. The common carotid artery has in several instances been tied with success for vascular nævus in the orbit.

**NÄFELS**, a village of Switzerland, in the canton of Glarus, and five miles north of the town of that name, in a deep valley, is one of the most famous battle-fields in the country. Pop. (1870) 2490. Here, in 1388, 1500 men of Glarus, under Matthias am Buhl, overthrew an Austrian force of from 6000 to 8000 men. The event is still celebrated yearly.

**NA'FTIA**, Lago, a curious small lake in Sicily, about two miles from Mineo, in Catania. It is situated in a plain, amidst craggy hills, and is of a circular form, commonly sixty or seventy yards in diameter, and about fifteen feet deep, but in dry weather shrinking to a much smaller size, and being occasionally altogether dried up. In the midst of it are three small craters, two of which perpetually send up water in jets to the height of two or three feet; the third is more intermittent. The water is greenish, or turbid, and has an odor of bitumen. The whole lake resembles a boiling cauldron, from the escape of carbonic acid gas, rushing upwards with great force. The atmosphere is consequently fatal to birds attempting to fly across the surface of the lake, and to small animals which approach it to satisfy their thirst; and an approach to it is attended with headache and other painful circumstances to man himself. The ancients regarded these phenomena with great dread. They supposed that Pluto, when carrying off Proserpine, drove his fiery steeds through this lake, ere his descent to the lower regions. A temple was erected here to the gods of the two craters, the *Dii Palici*, who were supposed to be twin sons of Jupiter, by the nymph Thalia. Pilgrims flocked to this shrine; and it afforded an inviolable asylum to slaves who had fled from their masters. An oath by the *Dii Palici* was never broken by the master, who found himself compelled here to come to terms with his runaway slave. No remains of the temple of the *Dii Palici* are left, although it is described as having been magnificent.

**NAGA** is, in Hindu Mythology, the name of deified serpents, which are represented as the sons of the Muni Kas'apa and his wife Kadra, whence they are also called *Kādraveyas*. Their king is Śeṣha, the sacred serpent of Vishnu.

**NAGAPATA'M**, a seaport of British India, on the Coromandel coast, in the province of Tanjur, 15 miles south of Karikal. It was taken by the Dutch in 1680, but fell into the hands of the English in 1781. Its site is an open sandy plain, elevated only three or four feet above sea-level. The port is visited by small vessels, and carries on some trade with Ceylon. Pop. at the census of 1871, 46,525.

**NAGARJUNA**, or Nāgasena, is the name of one of the most celebrated Buddhist teachers or patriarchs—the thirteenth—who, according to some, lived about 400 years, according to others, about 500 years, after the death of the Buddha S'ākyamuni (i. e., 143 or 43 B.C.). He was the founder of the Mādhyamika school, and his principal disciples were Aryadeva and Budhapālita. According to the tradition of the Buddhas, he was born in the south of India, in a Brahmanical family. Even as a child, he studied all the four Vedas; later, he travelled through various countries, and became proficient in astronomy, geography, and magical arts. By means of the last, he had several amorous adventures, which ended in the death of three companions of his, but in his own repentance, and, with the assistance of a Buddhist mendicant, in his conversion to Buddhism. Many miracles are, of course, attributed to his career as propagator of this doctrine, especially in the south of India, and his life is said to have lasted 800 years.—See E. Burnouf, "Introduction à l'Histoire du Bouddhisme Indien" (Paris, 1844); Spence Hardy, "A Manual of Buddhism" (Lond. 1853); W. Wassiljew, "Der Buddhismus, seine Dogmen, Geschichte und Literatur" (St Petersburg, 1860).

**NAGASA'KI**, or Nansensiki, a city and port of Japan, opened to foreign commerce by the treaty of 1858, on the first July 1859, is situated in 32° 44' n. lat., and 139° 51' e. long., on the western side of a peninsula in the northwest of the Island of Kiusiu. Previously to 1859, it was the only port in Japan open to foreigners. The harbor, which is one of the most beautiful in the world, is about six miles in width, and three or four in length. To a person inside, it appears completely land-locked, and it is surrounded by hills of about 1500 feet in height. These are broken into long ridges and deep valleys; while the more fertile spots are terraced and under cultivation. The town of N., which is about a mile in length, and three-quarters of a mile in width, lies on the north side of the bay; its population is estimated at 70,000. The streets in general are clean and well-paved, but the houses are not particularly good, except those possessed by courtesans, and known as "tea-houses." On the hills behind the town are various temples, those dedicated to "Sinto," or the worship of the sun goddess, which is the old national religion of Japan, and those in which the Buddhist worship, imported from China, is followed. The foreign settlement lies to the south of the native town, the British, French, German, Prussian, and Portuguese, consulates occupying the hilly ground back from the bay. On the opposite side of the bay, the Japanese have a steam-factory, under the direction of Dutch officers, and close by is the Russian settlement. The climate of N. is genial but variable. The trade of N. is inferior to that of Kanagawa. Sea-weed, salt-fish, and other articles are exported to China. The exports to Europe are mainly tea, tobacco, coal, ginseng, vegetable wax, and copper. The chief imports are cotton piece-goods, woollen goods, sugar, oils. The total value of imports in 1875 amounted to 1,617,000 dollars, and of the exports to close on 2,000,000 dollars. The import trade suffers (according to the consular report of 1872) from the very confined outlet of this market, the absence of wealthy native merchants, and of all the banking facilities, both foreign and native, existing at Hiogo, Osaka, and Yokohama.

**NA'GELFLUE**, the provincial name for a bed of conglomerate belonging to the *Molasse* (q. v.), which forms a considerable portion of the strata in the central region of Switzerland, between the Alps and the Jura. It is said to attain the enormous thickness of 6000 and 8000 feet in the Rhigi near Lucerne, and in the Speer near Wesen.

**NAGESUR**, the name under which the blossoms of the *Mesua ferrea* are sold in the bazars of India. See *GUTTIFERÆ*.

**NAGPUR**, a city of British India, capital of the province of the same name, and situated near its north-west extremity, in an unhealthy swampy hollow, 430 miles in a direct line east-north-east of Bombay. Inclusive of its extensive suburbs,

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it is seven miles in circumference. It contains no important edifices. The great body of the inhabitants live in thatched mud-tents, interspersed with trees, which prevent the circulation of air, and secrete moisture, thus rendering the town unnecessarily unhealthy. The mean temperature of N. is estimated at about 80° F. Cotton cloths, coarse and fine chintzes, turbans, silks, brocades, blankets, woollens, tent-cloths, and articles in copper and brass, are manufactured. Here, on the 26th and 27th November 1817, a small British force of 1353 men, commanded by Colonel Scott, defeated a native army of 18,000 men. Pop. (1872) 84,441.

NAGPUR, an extensive inland province of British India, is under the chief commissioner of the Central Provinces. Its area is 22,843 square miles, and its population in 1872 was 2,280,081; but this designation has been used to include a much greater area. The north part of the province is mountainous in character, being traversed by spurs of the great Vindhya range; the general slope of the surface is from north-west to south-east, and the Bay of Bengal receives the drainage of the country chiefly through the rivers Māhānadīff and Wain Gangā—the latter a tributary of the Godāvāri. The climate is not healthy, and is especially insalubrious in the extensive tracts of low marshy land which abound in the province. The Gonds (see INDIA), supposed to be the aborigines, are the most remarkable class of the inhabitants. They rear fowls, swine, and buffaloes; but their country, forming the south-eastern tracts—about one-third of the whole—is covered with a dense jungle, swarming with tigers. In the more favored districts, where the inhabitants are more industrious, rice, maize, oil, and other seeds, and vegetables are extensively cultivated. The rajahs of N., sometimes called the rajahs of Berar, ruled over a state formed out of that part of the great Mahratta kingdom. The dynasty, however, died out in 1833 and the territory came into the possession of the British. The province has five divisions—capital, Nagpur.

NAG'S HEAD CONSECRATION. This story, which was first circulated by the Roman Catholics forty years after the event, with respect to Archbishop Parker's consecration, was to the following effect. On the passing of the first Act of Uniformity in the first year of Queen Elizabeth, fourteen bishops vacated their sees, and all the other sees excepting that of Llandaff being vacant, there was a difficulty in maintaining the hitherto unbroken succession of bishops from apostolical times. Kitchin of Llandaff refused to officiate at Parker's consecration, and consequently the Protestant divines procured the help of Scory, a deprived bishop of the reign of Edward VI., and all having met at the Nag's Head Tavern in Cheapside, they knelt before Scory, who laid a Bible on their heads or shoulders, saying: "Take thou authority to preach the word of God sincerely;" and they rose up bishops of the New Church of England! The story is discredited by the Roman Catholic historian Lingard, and is carefully refuted by Strype in his life of Parker. The facts of the case are, that the election took place in the chapter-house at Canterbury, the confirmation at St Mary le Bow's Church in Cheapside, and the consecration in the chapel of Lambeth Palace. Scory, then elected to the see of Hereford; Barlow, formerly Bishop of Wells, then elected to Chichester; Coverdale, formerly of Exeter, and never reappointed to any see; and Hodgkin, suffragan of Hereford, officiated at the consecration. The Nag's Head story probably arose from the company having possibly gone from Bow Church, after the confirmation, to take a dinner together at the tavern hard by, according to the prevailing custom. The due succession of bishops in the English Church has never been broken.

NAGY, a Hungarian word, meaning "great." It is prefixed to the names of many towns in Hungary and Transylvania. In the present work, many of the towns that take this prefix are given under the name that comes after it.

NAGY BA'NYA. See BANYA.

NAGY ENYE'D a small town of Transylvania, on the Maros, 17 miles north-north-east of Karlsburg. It contains a famous Calvinistic college. Pop. (1869) 5719.

NAGY KARÓLY (i. e., Great Karóly), a town of Hungary, capital of the county Szathmar, 37 miles east-north-east from Debreczin, on a small feeder of the Theiss. It has several important annual fairs, and a trade in corn and cattle. Pop. (1869) 12,754.

**NA'HUM**, one of the twelve minor prophets, was a native either of Elkosh, in Galilee, or the son of a man named Elkosh. The identification of his birthplace with Capernaum (Nahum's Village) or a place called Elkosh, on the east side of the Tigris, not far from Nineveh, is the result of vague speculation. He was probably a contemporary of Isaiah, and flourished about 713-711 B.C. The burden of his "vision" (in 3d chap.) is the destruction of Nineveh and the downfall of the Assyrian kingdom. His style is full of animation, fancy, and originality, and at the same time clear and rounded. His language throughout is classical, and in the purest Hebrew, belonging to the second half of Hezekiah's reign, or to the time immediately following the defeat of Sennacherib before Jerusalem (2 Kings xix. 35, &c.). A commentary on N., with special reference to the Assyrian monuments lately discovered, has been written by O. Strauss (Berlin, 1853).

**NA'IA**. See **AKF** and **COBRA**.

**NA'IADES**, Naiadaeae, or Potameae, a natural order of endogenous plants divided by some botanists into several orders (*Juncagineae*, *Zosteraceae*, &c.), containing in all not quite 100 known species, all aquatic plants, some of them inhabiting the ocean, some found in lakes and ponds, some in streams. They are all of very cellular structure; the leaves have parallel veins, and the flowers are inconspicuous. To this order belongs the Pondweed (*Potamogeton*), of which a number of species abound in the still waters of Britain, and of which some are found as far north as Iceland. To this order also belongs the **GRASSWRAKE** (q. v.) of our shores, used for stuffing mattresses. The Lattice-leaf (q. v.) of Madagascar is one of the most interesting species, and one of the few which attract notice as in any way beautiful.

**NA'IADES**, in Grecian Mythology, the nymphs of fresh-water lakes, rivers, and fountains. They were believed to possess the power of inspiration; hence, soothsayers and others are sometimes called *nympholeptoi* (seized by the nymph). They were represented as half-clothed maidens, and not unfrequently as companions of Pan, of Hercules, the patron of warm springs, or of the Sileni and the Satyrs, in whose jovial dances they join.

**NA'IAST**, or **Na'taut** (Lat. *natare*, to swim), a heraldic term applied to a fish when borne horizontally across the shield in a swimming position.

**NAIGUE**, or **Naik**, a native subaltern officer among Indian and Anglo-Asiatic troops, whose functions are somewhat analogous to those performed among European troops by the drill-sergeant.

**NAILS** are flattened, elastic, horny plates, which are placed as protective coverings on the dorsal surface of the terminal phalanges of the fingers and toes. Each nail consists of a *root*, or part concealed within a fold of the skin; a *body*, or exposed part attached to the surface of the skin; and a free anterior extremity called the *edge*. The skin below the root and body of the nail is termed the *matrix*, from its being the part from which the nail is produced. This is thick, and covered with highly vascular papillae, and its color is seen through the transparent horny tissue. Near the root, the papillae are smaller and less vascular; hence the portion of nail corresponding to this part is of a whiter color; from its form, this portion is termed the *lunula*. It is by the successive growth of new cells at the root and under the body of the nail that it advances forwards, and maintains a due thickness, whilst at the same time its growth in a proper direction is insured. The chemical composition of the nails is given in the article **HORNY TISSUES**, to which class of structures they belong. According to the observations of Beau, the finger-nails grow at the rate of about two-fifths of a line in a week, while the toe-nails only grow with about one-fourth of that rapidity. When a nail has been removed by violence, or has been thrown off in consequence of the formation of matter (pus) beneath it, a new nail is speedily formed, provided the matrix has not been seriously injured.

There is a very common and troublesome affection popularly known as *ingrowing nail*. Its most usual seat is by the side of the great toe. It does not in reality arise from any alteration of the nail, but from the adjacent soft parts being constantly pressed by the use of tight shoes against its edge. These parts become swollen and inflamed; suppuration ensues, and an intensely sensitive ulcer is formed, in which the nail is embedded. Surgical advice should at once be resorted to in these cases,



as there is no probability that the ulcer will heal spontaneously, especially if the patient continue to move about, and thus keep up irritation. In obstinate cases, it is not unfrequently necessary to remove a portion of the nail, an operation attended with much pain, although quickly performed.

**NAILS**, pointed pieces of metal, usually with flattened or rounded heads, used for driving into wood-work, for the purpose of holding the pieces together. A variety, in which the head is very large, and the spike portion small, used by shoemakers for protecting the soles of boots and shoes from wear is called the *shoe-nail*; another, which is made by cutting thin plate-iron into thin pointed pieces of various lengths, is called *brads*; these sometimes are without heads, but are usually made with a slight projection by way of a head. When made small, with flat heads, for attaching cloth or hangings in upholstery-work, they are called *tacks*; and when very large for heavy carpentry, *spikes*.

*Nail-making*.—Formerly, all nails were hand-made, by forging on an anvil; and in Britain and the north of Europe, vast quantities are still made in this manner, being preferable, for many kinds of carpenters' work, to those made by machinery. In France, the greater part of the nails used for light carpentry-work are made of soft iron wire, pointed with the hammer; and in order to head them, they are pinched in a toothed vice, which leaves the portion for the head projecting, and makes below it three or four grooves in the nail, which increase its hold on the wood when driven home. The head is beaten into a counter-sinking on the vice, which regulates the size.

The iron used for hand nail-making in Britain is sold in bundles, and is called *nail-rods*; it is either prepared by rolling the malleable iron into rods or small bars of the required thickness—which process is only employed for very fine qualities—or by cutting plate-iron into strips by means of rolling-shears; these shears consist of two powerful revolving shafts, upon which are fixed discs of hard steel with squared edges. The discs of one shaft alternate with those of the other; they are of the thickness of the plate to be cut, and the shafts are so placed, that a small portion of one set of the discs are inserted between those of the other set. When the shafts are revolving, a plate of iron is pressed between the discs, and it is forcibly drawn through, the steel discs cutting the plates into strips with great rapidity. The quantity produced in this way is enormous, some mills turning out at the rate of ten miles per hour of nail-rods.

Several inventions, in which America took the lead, have been introduced, and are successfully worked, for making nails direct from plate-iron, either by cutting them out cold or hot; and a very large proportion of the nails in use are made in this way. Nail-making by machinery was originated in Massachusetts in 1810.

**NAIN DE TILLEMONT**. See **TILLEMONT**.

**NAIRN**, in the county of the same name, is a royal, parliamentary, and municipal burgh, and is 15 miles north-east by rail from Inverness. It is situated at the mouth of the river Nairn, on the west side, and for that reason was anciently called *Inver-Nairn*. Lying on the southern shore of the Moray Firth, which is here about eight miles across, it commands a grand and extensive view of the coast of Ross-shire, including Cromarty Bay, nearly opposite. N. was regalsied by William the Lion. It has little historical interest, and few objects worthy of antiquarian attention. It is principally remarkable for the excellency of its sea-bathing and artificial baths, in which respect it is equal, if not superior, to any town in the north of Scotland, as a resort in summer. The temperature is mild and equable. The inhabitants enjoy a remarkable immunity from epidemic diseases. There is a commodious harbor. The town has a literary society, a museum, a newspaper, three branch banks, and a savings bank. It is conspicuous for good and cheap education. Pop. in 1871, 8751. N. unites with Inverness, Forres, and Fortrose in sending a member to parliament.

**NAIRNSHIRE** is bounded on the n. by the Moray Firth, and on its other sides by the counties of Inverness and Moray, of the latter of which it anciently formed a part. It extends north and south 22 miles, and 15 miles from east to west. Its area is 21½ square miles, or 137,500 acres, of which about 26,000 are under cultivation. Pop. in 1871, 10,225, including the burgh of Nairn. Along with Elginshire, it returns one member to parliament. Constituency (1876—1877), 263; rental, £34,941. Nairn is

the only royal burgh in the county, but there are the villages of Cawdor and Auldern. The soil is for the most part light and sandy. There is, however, considerable agricultural activity, though the county is perhaps better known for its cattle-breeding. An important cattle "tryst" is held at Cawdor once a month during the greater part of the year. The climate of this country is distinguished for its salubrity, and the temperature is remarkably equable. The thermometer in the shade has not risen above  $78^{\circ} 8'$ , or fallen below  $11^{\circ} 2'$ , during the last twenty years. According to the latest observations, the yearly rainfall did not amount to more than 26 inches, the greatest fall being in October, and the least in April. At Brackla Distillery, which belongs to Robert Fraser, Esq., from 40,000 to 50,000 gallons of spirits are manufactured annually. The river Nairn runs through the county in a beautiful valley, which presents particularly attractive and romantic scenery in the neighborhood of Cawdor Castle, one of the residences of the Earl of Cawdor. This castle is of uncertain antiquity, and is in an excellent state of preservation. It was the residence of the ancient Thanes of Cawdor, one of whom is mentioned in "Macbeth." About the year 1510, the estates belonging to the earldom passed by marriage from the old family of Calder into the hands of a son of the Duke of Argyll, and are still in the possession of his descendants. Not a few other objects of antiquarian interest are to be found in the county of Nairn.

NAISSANT, a term applied in heraldic blazon to an animal depicted as coming forth out of the middle—not like *Issuant* or *Jessant* (q. v.), out of the boundary line—of an ordinary.

NAKHICHEVAN, on the Don, a thriving town of South Russia, in the government of Ekaterinoslav, on the right bank of the Don, and near the mouth of that river, two miles east of Rostov. It was founded in 1779 by Armenian settlers from the Crimea, and has (1867) 16,584 inhabitants, mostly Armenians, belonging to the Greek-Armenian Church. The inhabitants are engaged in the manufacture of silver ornaments and woollen goods, and an extensive trade is carried on.

NAKSHATRA (a Sanscrit word of doubtful etymology, but probably a compound of an obsolete base *naksha*, night, and *tra*, protecting, i. e., literally night-protecting) means properly star, and is used in this sense in the Vedas. At a later period, it was applied to the asterisms lying in the moon's path, or to the mansions in which the moon is supposed to rest in her, or rather, according to Hindu notions, *his* path. The number of these asterisms was reckoned originally at 27, later at 28; and mythology transformed them into as many daughters of the patriarch Daksha, who became the wives of the moon. See MOON. Biot, the distinguished French astronomer, endeavored to shew that the Hindu system of the Nakshatras was derived from the Chinese *shen*; but his theory, though supported by very learned arguments, has been refuted by Professor Whitney, in his notes to Burgess's translation of the "Sūrya-Siddhānta" (New Haven, United States, 1860), and by Professor Müller in his preface to the 4th volume of the "Rig-Veda" (Lond. 1862); for their arguments leave little doubt that the system of the Nakshatras originated from the Hindu mind.

NALA is a legendary king of ancient India—a king of Nishadha—whose love for Damayanti, the daughter of Bhīma, king of Vidarbha, and the adventures arising from, or connected with, it—the loss of his kingdom, the abandonment of his wife and children, and their ultimate restoration—have supplied several Hindu poets with the subject of their muse. The oldest poem relating to Nala and Damayanti is a celebrated episode of the "Mahābhārata" (q. v.), edited both in India and Europe, and translated in Latin by Bopp; in German by Kosegarten, Bopp, Rückert, and Meier; and in English by Dean Milman. The two other renowned poems treating of the same legend, but with far less completeness, are the "Nalodaya" (q. v.) and the "Naladhacharita" of Śrī-Harsha.

NALODAYA is the name of a Sanscrit poem which is highly prized by the modern Hindus. Its subject is the story of Nala (q. v.), but more concisely narrated than in the episode of the "Mahābhārata," whence its contents are borrowed; and its reputed author is Kālidāsa (q. v.). Great doubts, however, must attach to the attribution of this authorship, if by Kālidāsa the author of "Śākuntala" is meant, and not some other poet bearing the same name; for the merits of this poem consist neither in elevation of thought nor in richness of fiction: they are sought for by the

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Hindus in its elaborate and artificial diction, and in its alliteration of every variety, which, to a European mind of culture and taste, would be no more than an intolerable jungle of sounds, devoid of all poetical worth. The text of the poem, with a modern commentary, has been edited (Berlin, 1830) by F. Benary; and (Calcutta, 1844) by W. Yates, who added to his edition a free metrical translation of the text, and an essay on Sanscrit Alliteration.

**NAMAQUALAND, Great.** The extensive region in South Africa north of the Cape Colony, extending from the Orange River, lat.  $29^{\circ} 30'$ , to Walfish Bay, lat.  $23^{\circ}$ , and stretching inland from the west coast to the Kalihari Desert, comprehending an area of about 100,000 square miles, is known under the name of Great N., being principally inhabited by wandering tribes of Namaquas, (q. v.). This region is drained principally by a large periodical water-course, called the Onp, Borradsale, or Great Fish River, which, running from north to south a distance of about 450 miles, joins the Orange River nearly at right angles, about 90 miles from its mouth. It is generally, except in its northern parts, where the country rises into extensive and lofty plateaus, a most sterile and barren region, and along a coast-line of upwards of 400 miles does not present a single running stream, much less a navigable river, although a few little bays along the coast, such as Augra Pequena, Sandwich Harbour, and Walfish Bay, afford safe anchorages. The valley of the Onp is bounded on each side by ranges of flat-topped barren mountains, which to the eastward die away into the waterless though wooded flats of the Kalihari Desert, and coastwards stretch into vast sandy downs, against which the Southern Atlantic beats an unceasing surf, rendering landing very dangerous, and enveloping the coast in a perpetual mist. The chief productions of the region are cattle, for the rearing of which the country seems favorable. On the edge of the Kalihari, ivory and ostrich feathers are collected, and copper ore seems abundant in several localities. Guano is found at Ichaboe and many little islands on the coast, and considerable fisheries are carried on by Cape houses in many of the bays.

The lion, giraffe, rhinoceros, hippopotamus, and large game generally, are still found in N., although fast diminishing before the firearms of the Namaquas. The snakes are considered especially venomous. The gemsbok, eland, and other large antelopes, now almost unknown in the Cape Colony, are still numerous in the little-frequented wastes of this region. The climate is extreme, and though, on the whole, not unhealthy, is very trying to European constitutions. The water is generally brackish. The first English traveller in N. was Sir J. Alexander, who, in 1837, traversed it from north to south. Charles John Anderson has also explored every part of it. Information on the region may be also found in the travels of Moffat, Campbell, and Le Vaillant. The native tribes, who may perhaps number about 40,000 souls, speak the Namaqua language, the purest type of the Hottentot.

**NAMAQUALAND, Little,** is a division of Cape Colony south of the Orange River, formerly part of the district of Clanwilliam, and included with the country north of it under the general name of Namaqualand. It is a very barren region, covered with rugged volcanic-looking hills, through which the Gariep or Great Orange River appears, through some convulsion of nature, to have forced its way to the sea. Little N. has of late years afforded a very large supply of copper ore of excellent quality (in 1878 near 12,000 tons); but the mines, although well known to the Dutch 200 years ago, were not worked till after 1852. The principal river is the Orange of the colonists, which divides the Cape Colony from Great Namaqualand; all the other streams are merely periodical torrents, often dry for years. The seat of magistracy is at Springbok Fontein, about 80 miles from the principal harbor, Hondeklip Bay, and where are situated the very rich mines of the Cape Copper Company. Many scattered tribes of Namaquas and Bastard Hottentots roam along the bank of the Orange River; and in the neighborhood of the mines are numerous Dutch farmers and English settlers. All the larger mammalia, except a few gemsbok, are extirpated; but troops of ostriches are still numerous on the grassy flats of the Bushman country. The geological features of this region are peculiarly interesting, and have been thoroughly explored by A. Wylie, on behalf of the Cape government. The rocks are generally of granite or gneiss, intersected with numerous veins of cupreous indications, and near the Orange River, present many very curious features. The coast-line extends for 100 miles, with a few little bays,

such as Port Nolloth and Hondeklip, where there is tolerably safe anchorage, and generally presents a shore covered with low granite rocks. At Hondeklip Bay, a large boulder painted red forms a distinguishing landmark.

**NAMA'QUAS**, the principal existing tribe of the race generally known under the name of Hottentot. They inhabit the region called Great Namaqualand, north of the Gariep or Orange River, and the country a few miles south of it, as far as the Kamiesbergen. They are a pastoral people of rather predatory habits, and live under the rule of their chiefs, whose powers, however, are of a very limited nature. Differing from the Bosjesmen Hottentots, the N. are a tall, well-made, active people, although presenting the usual peculiarities of the race, such as the light olive complexion, the oblique eye, and short tufted hair. They speak a dialect of the Hottentot language, which, however, differs considerably from that used by other tribes of that people. Mission stations of the Rhenish and Wesleyan societies have been for many years established amongst them, and in a few localities, near the Cape Colony, with considerable success; and the New Testament and some elementary works have been translated into the Namaqua dialect. On the northern borders of the regions they inhabit, the N., under the chief Afrikaner, the descendant of a fugitive slave from Cape Colony, have for many years kept up a predatory and bloody war with the tribes of Ovampos and Damaros, who live north of Walfish Bay. The total number of N. cannot exceed between 50,000 and 60,000 souls, scattered over a region of at least 150,000 square miles; and there is every prospect of the pure Hottentot tribes soon becoming extinct, or at least absorbed, being gradually supplanted by the more energetic and civilised Bastard races, who, in point of civilization and appearance, are very little inferior to the ordinary Dutch Boer of Cape Colony. Many of the southern N. possess wagons and oxen, and are employed in the transport of copper ore from the mines of Little Namaqualand to the shipping port at Hondeklip Bay.

A few of the peculiar customs of the Hottentot tribes, described by Kolben nearly 200 years ago, may be still traced amongst the more remote tribes of the N.; but contact with the Cape Colonists, and the efforts of the missionaries, have partially civilised this race, so that an ordinary Hottentot is quite as respectable a savage, or perhaps more so than his Boijouarn or Amakosa brethren.

**NAMAYCUSH** (*Salmo namaycush*), a fish nearly allied to the salmon and trout, a native of the great lakes and interior rivers of North America. It is often taken of a size varying from 20 to 40 lbs., and is said sometimes to reach 60 lbs. It is much esteemed for the table. It is caught at the same fisheries with the still more prized Whitefish (q. v.).

**NAME** (Sax. *nama*, Ger. *name*, Lat. *nomen*, Gr. *onoma*), the word by which a particular person or things is signified in distinction from other persons or things. A name attached to a person is called a proper name. Names distinguishing one individual from another have been in use from the earliest ages of human society. Among the Jews, the name given to a child either originated in some circumstance of birth, or was an expression of religious sentiment. Old Testament names are almost all original—i. e., given in the first instance to the person bearing them; but the Jews, like other nations, after accumulating a considerable stock of names, began to repeat them, and to find few names in the New Testament which had not been used before. In Old Testament times, it was an occasional practice to adopt a change of name on the occasion of an important event in one's life.

The Greeks bore only one name, given on the tenth day after birth, which it was the right of the father to choose, and alter if he pleased. The earliest Greek names are generally expressive of some quality in high estimation, as valor, skill, wisdom, or gracefulness (Callimachus, excellent fighter; Pherecrates, strength bringer; Sophron, wise; Melanthus, black flower). In later times, when the faith in the gods was on the wane, names, derived from Apollo and Athene, or indicative of the favor of Olympus (Apollodorus, gift of Apollo), came more into fashion. The eldest son generally bore the name of his paternal grandfather, and the confusion arising from the repetition of the same name was attempted to be obviated by appending the father's name (either simply, or turned into a patronymic), the occupation, the place of birth, or a nickname.

The Romans at a very early period bore two names, and afterwards every Roman

citizen had three. The *prænomen*, like our Christian name, was personal to the individual—Caius, Marcus, Cneius; in writing generally abbreviated to an initial or two letters, C., M., or Cn. It was given in early times on the attainment of puberty, and afterwards on the ninth day after birth. There were about thirty recognised *prænomina*. Women had no *prænomen* till marriage, when they took the feminine form of that borne by their husband. Every Roman citizen belonged both to a *gens* and to a *familia* included in that *gens*. The second name was the *nomen gentilitium*, generally ending in *-ius*, *-eius*, or *-aius*. The third name was the hereditary *cognomen* belonging to the *familia*. *Cognomina* were often derived from some bodily peculiarity, or event in the life of the founder of the family. A second *cognomen*, or *agnomen*, as it was called, was sometimes added by way of honorary distinction. In common intercourse, the *prænomen* and *cognomen* were used without the *nomen gentilitium*, as C. Cæsar for C. Julius Cæsar, M. Cicero for M. Tullius Cicero. The Roman names were in their origin less dignified and aspiring than the Greek; some were derived from ordinary employments, as Porcius (swineherd), Cicero (vetch grower); some from personal peculiarities, Crassus (fat), Naso (long-nosed); a few from numerals, Sextus, Septimus.

The Celtic and Teutonic names, like the Jewish and Greek, had been originally very significant; but at an early period their exuberance became checked; people contented themselves with repeating the old stock. While the speech of Europe was undergoing a transformation, the names in use remained the same; belonging to an obsolete tongue, their signification by and by became unintelligible to the people using them. Many are derived from "God," as Gottfried, Godwin; some from an inferior class of gods known by the title *as* or *ana*, whence Anselm, Oscar, Esmond; others from elves or genii, Alfred, Alboin, Elfric (Elf King). Bertha is the name of a favorite feminine goddess and source of light, from the same root as the word "bright;" the same word occurs as a compound in Albrecht, Bertram. To a large class of names indicating such qualities as personal prowess, wisdom, and nobility of birth, belong Hildebrand (war brand), Konrad (bold in counsel), Hlodwig (glorious warrior), called by us Clovis, and the original of Ludwig and Louis. The wolf, the bear, the eagle, the boar, and the lion entered into the composition of many proper names of men, as Adolf (noble wolf), Arnold (valiant eagle), Osborn (God bear). Respect for feminine prowess also appeared in such names as Mathilde (mighty amazon), Wolfhilde (wolf heroine). The spread of Christianity threw a number of the old names into comparative oblivion, and introduced new ones. The name selected at baptism was more frequently taken from the history of the Bible or the church than from the old traditional repertory, which, however, was never altogether disused. Many names, supposed to be local and very ancient, particularly in the Scottish Highlands, Wales, and Cornwall, are in reality but corruptions of names of Christian origin which are in use elsewhere. Owen, Evan, and Eoghau (the latter often Anglicised into Hector) seem all to be forms of John or John. A change of name was sometimes made at confirmation.

Periods of religious and political excitement have had a very powerful influence in modifying the fashion in names. The Puritans would only admit of two classes of names, those directly expressive of religious sentiment—Praise-God, Live-well—and names which occur in Scripture; these latter indiscriminately made use of, however obscure their meaning, or however indifferent the character of the original bearer of them. Old Testament names were used in preference to New, probably because they did not convey the notion of a patron saint. Old Testament names still prevail largely in America, where exists a medley of Christian names from all possible sources. At the French Revolution, names supposed to savor of either loyalty or religion were abandoned, and those of Greek and Roman heroes came into vogue instead. The Augustan period of English literature gave a temporary popularity to such feminine names as Narcissa, Celia, Sabina. In Germany, the names in use are particularly free from foreign admixture; they are almost all either of Teutonic origin, or connected with the early history of Christianity. In Britain, the number of names has, particularly since the Reformation, been more limited than in most other countries. In some families of distinction, unusual names have been handed down from father to son for centuries—e. g., Penrhyn among the Berties, and Sholto in the Douglas family. The accumulation of two or more Christian names only became common in the present century, and another

practice which has gained ground in Britain is the use of surnames as Christian names. More recently, various old names, particularly feminine names, as Mand, Florence, Ethel, have been withdrawn from their obscurity, and resuscitated.

The use of fixed family *surnames* cannot be traced much further back than the latter part of the 10th century. They first came into use in France, and particularly in Normandy. At the Conquest, they were introduced into England by the Norman adventurers, and were general at the Domesday Valuation. Many of the followers of William had taken names from their paternal chateaux or villages on the other side of the Channel, names which were used with the French preposition *de* before them. Their younger sons and others applied the "*de*" to estates awarded to them as their portion of the conquered country, and called themselves De Hastings, De Winton, &c., a prefix probably never in vernacular use in England, and completely discarded with the disappearance of Norman-French, unless in a few cases where it was retained for the sake of euphony, or from coalescing with the initial vowel, as in De la Bèche, Danvers (d'Anvers), Dangerfield (d'Angerville). When English was used in place of Norman-French, the "*de*" was always rendered into "*of*." The affectation of resuming it in recent times is as unwarrantable in theory as in taste. Such a designation as Lord De Tabley of Tabley House is an unmeaning tautology. The Scotch have a more expressive designation when they say Colquhoun of that ilk. In France and Germany, a territorial surname (denoted by "*de*" or "*von*") came, when surnames spread to all classes, to be the mark of nobility, so much so that in later times, when any one was ennobled by the sovereign, the "*de*" was prefixed to his previously plebeian and not territorial name. In Britain the "*de*" was never considered the test of nobility; the names of some of the most distinguished families were not territorial—e. g., Stewart, Butler, Spencer. In Scotland, surnames were hardly in use till the 12th c., and were for a long time very variable. The assumption of surnames by the common people is everywhere of much later date than their use by noble (gentle) families. As yet they can hardly be said to be adopted by the people of the wilder districts of Wales.

There are many existing local surnames in Britain besides those derived from the names of the manors of the gentry or landholders. Farms, homesteads, the natural features of the country, all gave their names to those who resided at or near them; hence such names as Wood, Marsh, Dale. The preposition "*at*" is in a few cases retained, as in Atwood, A'Court, Nash (atten-ash, i. e., at the ash). The travelling habits of the Scots account for such names as Inglis, Fleming, Welsh (the original of Wallace), applied to those who had visited foreign parts; and sometimes a Scotsman, wandering into England, returned with the acquired name of Scott.

A large class of surnames are patronymics, often formed by "*son*," or its equivalent in the language of the country, added to the Christian name of the father. Names of this sort often fluctuate from generation to generation. Alun Walterson had a son, Walter, who called himself Walter Alanson. The genitive case of the father's name sometimes served the same purpose, as Adams, Jones; and similarly in Italian, Dosso, Dossi. A fashion of using "*Fitz*," the equivalent of "*son*," before the ancestral name, as in Fitzherbert, prevailed temporarily in Normandy, whence it was imported into England. In the Highlands of Scotland, the prefix "*Mac*" (Macdonald) served the same purpose, which, however, fluctuated far longer than the patronymic surnames of England and the Lowlands; so also the "*O*" (grandson) of the Irish (O'Neill), and "*Ap*" of the Welsh (Ap Rhys, otherwise Apreece). The "*de*" of France had sometimes a similar origin, as in d'André, d'Hugues; and still more frequently the "*de*," "*dei*," or "*degli*" of Italy—di Cola, di Giacomo.

Office, occupation, or condition, gives rise to surnames—e. g., Knight, Marshall, Pace, Smith, Brewster, Shepherd; in Germany and Holland, Rauber and de Rogver (robber); and from such appellatives, patronymics may be again derived; thus, we have Smithson, de Maître (master's son), M'Nab (son of the abbot), M'Pherson (son of the parson), del Sarto (son of the tailor), &c. So also personal qualities—Black, White, Strong, Stark, Lang (long), Littlejohn, Crinkshanks; and nicknames have not infrequently been perpetuated as surnames. We have also surnames derived from the signs and cognizances which were borne in the middle ages, not only by fairs and shops, but by private houses. John at the Bell became John Bell; at Midleberg, in Holland, Simon, apothecary in the "Drake," or Dragon, became Simon Drack; hence, probably, the frequency of family names derived from animals, and

also of those beginning with "Saint," though this last class may, perhaps, sometimes have had its origin in the first owner of the name dedicating himself to the service of the saint in question. In Scotland and Ireland, "The" is a distinctive title borne by the heads of some old families—as "The Chisholm," "The O'Connor Don." In the Highlands of Scotland, the chief of a clan is usually addressed by the name alone in a marked manner: thus, "Macleod" implies specially Macleod of Dunvegan, in Syke, head of the clan Macleod; "Makinintosh," in like manner, applies solely to Mackintosh of Moy, in Inverness-shire.

In England, the number of existing surnames approaches to 40,000, or about one to every five hundred individuals; in Scotland, there are far fewer surnames in proportion to the population. The remarkable predominance of certain surnames in certain localities—as Campbell, Cameron, Macleau in Argyshire, Macdonald in Inverness, Mackay in Sutherland, Gordon and Forbes in Aberdeenshire, and Scott, Ker, Elliot, Maxwell, and Johnstone on the borders—arises from the clansmen having made a practice of taking the name of their chiefs, considering themselves members of their family by adoption, if not otherwise. Elsewhere than in Scotland, vassals often adopted the names of their lords, and servants those of their masters. Two or more surnames are often borne by one individual, in which case the paternal surname is sometimes placed first, sometimes last; and, in recent times, it is by the name which occurs last that the bearer of the two surnames is most frequently known.

The wife, with us at least, changes her surname to that of her husband on marriage. In the continent, it is not unusual for the husband to append his wife's name to his own; and in Spain, the wife retains her own name, while the son is at liberty to use either paternal or maternal name as he pleases, the choice generally falling on the best family.

*Change of name.*—Prior to the Reformation, surnames were less fixed than they have since become. Occasionally, younger sons, instead of retaining their patronymic, adopted the name of their estate or place of residence. A great matrimonial alliance was a frequent cause for adopting the patronymic of the wife. With the clergy, ordination was a common occasion of a change of name, the personal surname being exchanged for the name of the place of birth—thus, William Louge became William of Wykeham. In time of political troubles, a new name was often assumed for concealment; and in Scotland, the name of M'Gregor was proscribed in 1664 by an act of the privy council. In modern times, injunctions in settlements of land, and deeds of entail, are frequent grounds for a change of name, it being made a condition that the devisee or disponent shall assume a certain surname under penalty of forfeiture, a stipulation which the law recognises as valid. Such an obligation is often combined with one relative to arms. In a Scotch entail, it is a very frequent condition that each succeeding heir of entail, or husband of an heiress of entail, shall assume the entailor's name and arms, or his name and arms *exclusively*; in the former case, he may, if he pleases, continue to use his own surname along with the assumed one. The heir of entail is not held legally to take up any arms not otherwise his own, unless he have applied to the heraldic authorities for leave so to do. Where a Scotch entail contained an injunction to bear arms which had no existence in the official record of arms, the condition has not been held to be null; the heir of entail must apply to the Lord Lyon for a grant of arms bearing the designation of those disposed. In England, it used to be common to obtain a private act of parliament to authorise one to change his surname; and authority for such a proceeding has generally been given in later times by royal licence, which is granted only on a reasonable ground being established for the alteration, to the satisfaction of the kings-at-arms, to whom a remit is made. It has sometimes been supposed that this royal licence is necessary to legalise such a change, but the highest legal authorities have laid it down that there is nothing in the law of England to prevent any one, who may consider it for his interest so to do, to change his surname, or even his Christian name. The idea, lately prevalent to some extent, is equally erroneous, that an advertisement in a gazette or newspaper, or the execution of some deed, is a necessary form in order to effect a change of name. There are always great inconveniences in changing one's name, which sufficiently account for the general indisposition to do so, except from a questionable motive. As there is no law to prevent a person from changing his

name, so there is, on the other hand, no law to compel third parties to use the new name, and disputes and annoyances arising from such a state of things are matters of course. The change tends to a certain extent to destroy the means of identification after the lapse of years, which may or may not be the object desired. Notwithstanding these difficulties and inconveniences, there are many examples of persons who have succeeded after a few years in being generally known under a new name, and of the public as well as his friends recognising it. The change of name, in general, produces no change whatever on the legal status. A party is equally punishable for swindling, larceny, and other cognate offences, whatever name he uses; and, on the other hand, if he is legat-e, he is not prevented from establishing and receiving his legacy, whatever name he has adopted. It follows from what precedes that no person is punishable for using a new name, though it is sometimes an ingredient for a jury to take into consideration when they are required to infer a particular motive of conduct. The royal licence is practically required to be obtained by Englishmen (not Scotchmen) holding commissions in the army, as also when the change of name is to be accompanied by a change of arms, it being the practice of the English Heralds' College to refuse to grant arms corresponding to such change, unless the royal licence have been obtained. In Scotland, a *bona fide* change of name requires neither royal, judicial, nor parliamentary authority, the sole exception being the case of members of the College of Justice, who require the permission of the Court of Session. A royal licence is not generally applied for by natives of Scotland, as it is not required to be produced to the Lord Lyon on applying for a corresponding change of arms. The arms will generally be granted when the Lord Lyon is satisfied that the change has been made on some reasonable ground, and not from a purely capricious motive; and the fact of the change of name, with the reason why it has been made, are narrated in the new patent of arms. When such change of surname and corresponding change of arms has been made by a Scotsman who is an officer in the army, the authorities of the War Office are in the habit of requiring a certificate from the Lyon Office to the effect that the change is recognised there.

*Names of places.*—These, like names of persons, belong, in a great measure, to the language of past races. All over Great Britain, a very large proportion are derived from the Celtic names for natural features of the country. From *Gwyng*, *afon*, *lawn*, *llyn*, *cydyl*—in the Celtic speeches equivalent to *water* or *river*—we have Eak, Avon, Wye, Thames, Tavy, Clyde. *Pen* or *Ben*, hill, gives rise to the names of hills in England and Wales (Penrhye, Peuzance), and still more in Scotland (Ben Nevis). So, also, *cwm*, *comb*, valley—as in Cumberland, land of valleys. The memory of the Roman invasion has been preserved in the termination *-chester* (derived from *castra*) in the names of towns, as Manchester. Though surnames often originated in local names, the reverse process also occurred; as where *vill*, *ton* or *ington*, *ham* or *burgh*, has been appended to the name of the owner of the land, e. g., Charleville, Johnston, Wymondham, Edinburgh (i. e., Edwin's burgh).

See Pott's "Die Personennamen und ihre Entstehungsarten" (2 vols., 1858; 2d ed. 1860); Miss Yonge "History of Christian Names" (Lond. 1863); Lower, "On English Surnames" (Lond. 1849); Professor Innes, "Concerning Some Scotch Surnames" (Edin. 1860).

NAMUR, a province of Belgium, bounded on the n. by Brabant and Liège, e. by Luxemburg, w. by Hainault, and s. by France. Area about 1400 square miles. Pop. (December 1874) 819,336. The principal rivers are the Meuse—which entirely intersects the province—the Sambre, and the Lesse. N. presents generally an alternation of fruitful valleys and low hilly tracts; but in some parts, where the heights constitute offshoots of the Ardennes, and are densely wooded, they attain a considerable elevation. With the exception of the land in the south-west, where there are large tracts of bog and heath, the soil is extremely rich, yielding abundant crops and fine pasture. The chief products of N. are wheat, oats, hops, oil yielding plants, and flax. Besides iron, copper, lead, and coal mines, N. has marble and slate quarries, and yields sulphur, alum, cadmium, alumina, flints, &c. It has good steel, iron, and smelting works, breweries, paper-mills, &c. N. is divided into the three arondissements of Namur, Dinant, and Philippeville. At the close of the 12th c., N. was united to Luxemburg, after having existed as an independent countship for upwards of 150 years. Towards the middle of the 18th c., it passed by purchase to the



Namor  
Nanking

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House of Flanders, which retained possession of it till 1430: when, on the death of Count John III., without direct heirs, the countship, which was in a state of extreme financial embarrassment, was purchased for 132,000 gold ducats, by Philip the Good, Duke of Burgundy, and subsequently shared the fate of the other Burgundian states.

NAMUR (Flem. *Namen*), the chief town of the province of the same name, is situated at the confluence of the Sambre with the Mense, and is a strongly fortified town and the seat of a bishop. Pop. in 1876, 25,066. Among its seventeen churches, the cathedral, or St Aubin's, which was consecrated in 1172, is one of the most beautiful churches of Belgium. M. has an academy of painting, a conservatoire for music, two public libraries, a museum, and hospital for aged paupers, a theological seminary, and two colleges, one conducted by Jesuits. The present citadel was constructed in 1754, but the city has been fortified from the earliest period of its history; and in 1692, its defensive works were repaired and strengthened by Coehoorn, only, however, to be taken in the following year by Louis XIV. and Vauban, the latter of whom added considerably to its original strength. The reputation of its citadel made N. a prized stronghold in every war of later times; and after having been gallantly defended by its French conquerors, in 1815, against the Prussians under Pirch, it was finally restored to the Netherlands after the battle of Waterloo, and at once put into thorough repair. N. is noted for its cutlery, its leather-works, and its iron and brass foundries.

NA'NAS, a town of Hungary, in the midst of extensive morasses, about 110 miles east-north-east from Pesth. The population, partly Protestant and partly Roman Catholic, is employed in cattle-husbandry and agricultural pursuits. Pop. 11,300.

NANA SAHIB, a Hindu, one of the leaders of the sepoy revolt of 1857. He was said to be the son of a Brahmin from the Deccan, and his real name was Dindaia Pant. He was born about 1820, and was adopted as a son in 1827 by Bajee Rao, the childless ex-pelshwa of Poona, thereby, according to Hindu law and custom, acquiring most of the rights of a legitimate son. He was educated as a Hindu nobleman—taught English, and brought much in contact with the European officers, in whose amusements he seemed fond of participating. A decision was, however, come to by the government of Calcutta, that they should not recognise rights to pensions or indemnities acquired by adoption; and in consequence, N. S. was refused the continuance of a pension of eight lacs of rupees, paid to his adopted father under a treaty made in 1818. This is believed to have rankled in his mind, along with slights he received from the supercilious English youth with whom he came in contact. He was allowed to retain some of the state of a native prince—a retinue of 200 soldiers, with 3 field-pieces, and a fortified residence at Bithoor, 10 miles west of Cawnpore. When the mutiny broke out in May 1857, he offered to assist the English, but instead, he treacherously placed himself at the head of the mutineers. The European troops were induced, on the 25th of June, to capitulate to N. S., who promised they should be sent down the Ganges in safety. They got on board boats provided for them, but had no sooner done so, than two guns were unmasked, and a murderous fire was opened upon them. The sepoys were ordered to shoot the men, but to spare the women and children, who, when their husbands and parents had been shot, were removed to a house in Cawnpore. On the 15th July, Sir H. Havelock, who had advanced to their assistance from Allahabad, defeated the sepoys in two engagements, one within 8 miles of Cawnpore; and N. S. next day directed that the women and children should be put to death, an order carried out with unparalleled atrocity. A long series of engagements against N. S. followed, in which he was always the loser, and he was ultimately driven beyond the English frontier into Nepal. In 1860, his death was announced, but two years later, new movements were discovered, which were attributed to him, and it is not certainly known whether he is dead or alive. Several persons have been arrested on suspicion of being N. S., but in all cases a mistake has been made. A column has been erected at Cawnpore in memory of those who perished in the massacre.

NANCY, a beautiful town of France, capital of the department of Meurthe-et-Moselle, is situated on the left bank of the river Meurthe, at the foot of wooded

and vine-clad hills, 220 miles east of Paris, on the Paris and Strasburg Railway. Pop. (1876) 66,303. It is divided into the old and new towns (the former irregular and with narrow streets, the latter open and handsome), and comprises also two suburbs. It contains many handsome squares and imposing edifices, and owes much of its architectural ornamentation to Stanislaus Leczinsky, who, after abdicating the crown of Poland in 1735, continued to reside here as Duke of Lorraine till his death, in 1766. His statue stands in the Place Royale, a fine square, surrounded by important public buildings, as the Hôtel de Ville, theatre, &c. The gates of N. look more like triumphal arches than the ordinary entrances of a town. Among the institutions are the university-academy, the normal school, the school of medicine, the lyceum, the public library, and numerous art and scientific societies. Cotton, woollen, and linen manufactures are carried on; but the principal branch of industry is the embroidering of cambric, muslin, and jaconet goods. N. is known to have existed in the 11th c. Two centuries later, it became the capital of the Duchy of Lorraine (q. v.). Charles the Bold was killed while besieging N. in 1477.

NA'NDU, or American Ostrich (*Rhea*), a genus of South American birds allied to the ostrich, cassowary, and emu, and most nearly to the ostrich, from which it differs in having the feet three-toed, and each toe armed with a claw; also, in being more completely feathered on the head and neck; in having no tail; and in having the wings better developed and plumed, and terminated by a hooked spur. The wings are indeed better developed than in any other of the *Struthionidae*, although still unfit for flight. The neck has sixteen vertebrae. There are at least three species. The best known species (*R. Americana*) is considerably smaller than the ostrich, standing about five feet high. It is of uniform gray color, except on the back, which has a brown tint. The male is larger and darker colored than the female. The back and rump are furnished with long feathers, but of a more ordinary kind than those of the ostrich. This bird inhabits the great grassy plains of South America, southward of the equator, abounding on the banks of the La Plata and its more southern tributaries, and as far south as lat. 42° or 43°. Its range does not extend across the Cordilleras. It is generally seen in small troops. It runs with great celerity, using its wings in aid. It is polygamous, one male securing possession of two or more females, which lay their eggs in a common nest, or drop them on the ground near the nest, to which the male rolls them. Contrary to the usual habit of birds, incubation is performed by the male. The N. is shy and wary, but is successfully hunted by the Indians, generally on horseback. The flesh of the young is not unpleasant. The N. is capable of being domesticated.—A smaller and more recently-discovered species (*R. Darwini*) has light-brown plumage, each feather tipped with white. It inhabits Patagonia. A third species (*R. macrorhyncha*) is distinguished by its large bill.

NANKEEN CLOTH. Calico of the kind called "nankeen" or nankin, was formerly imported extensively from China to Europe, and said to be the manufacture of Nanking; the color, a yellowish-buff, being a favorite one. It was supposed that the Chinese held a secret for dyeing this color, which was found to be remarkably durable; but it became known that it was not an artificial color at all, the cloth being made of a colored variety of cotton, which was produced occasionally in China and India. Artificially dyed nankeen cloths now form a considerable export from England to China.

The color of artificial nankeen cloth is produced by an elaborate process, in which the yarn or cloth is first dipped in a saturated solution of alum; then in a decoction of oak-bark; then in a bath of lime-water; and next in a bath of nitro-muriate of tin. Another, but less permanent, nankeen dye is produced by boiling alumina in a strong solution of pearl ashes, and diluting with water to the required tint.

NANKING, capital of the province of Kiangsu, formerly the capital of China, on the Yangtze River, 90 miles from the beginning of its estuary, n. lat. 32° 40' 40", e. long. 118° 47'. Its name signifies the Southern Capital. Since the removal of the seat of government to Peking (Northern Capital), it has been called by the Chinese Kiangning-fu. The walls enclose an area of nearly 20 miles in circumference, the greater part of which, however, is entirely waste. They reach in many places an elevation of 70 feet, and are fully thirty feet in thickness at the

base. According to Chinese accounts, the population of N. was once 4,000,000, but a more recent estimate made it 309,000. As the city, however, has of late passed through so many vicissitudes. It is impossible to ascertain its present number of inhabitants. The inhabited portion of the walled area lies toward the west, and several miles from the bank of the river. It is no longer possible to speak of N. in the language which former travellers used. The barbaric desolations to which it was subjected during the Taeping rebellion left it a sort of wreck, and one can only describe it as it was, before the victorious assault of the rebels, on the 19th March 1852. N. is the seat of the vice-regal government for the provinces grouped together under the name of Kiangnan. Here, as elsewhere in China, there was, and again is, a Manchu garrison, or military colony, separated by a wall from that portion of the city which is occupied by the Chinese. Some of the finest streets of N. were in the Tartar city; several being nearly 40 feet wide, having a space in the middle of about 8 feet in width, flagged with well-hewn blocks of blue and white marble, and on each side of this a brick pavement 14 feet or more wide. A deep canal or ditch runs from the river directly under the walls on the west, serving to strengthen the defences of the city on that side. The ancient palaces have all disappeared. The offices of the public functionaries were numerous, but, like the shops, presented the general features common to all Chinese towns. The objects most worthy the inspection of the traveller are found, in ruins, outside the precincts of the modern city. Among these is the summer palace of the Emperor Kienlung. It consisted of a number of one-story buildings, with spacious courts between, and flanked by smaller buildings on the sides. Enough still remains to shew that the workmanship was of the most elaborate and unique character. When under cultivation, the spot must have been exceedingly beautiful. The tombs of the kings are remarkable for their sepulchral statues, which form an avenue leading up to the graves; they consist of gigantic figure, like warriors cased in a kind of armor, standing on either side of the road, across which, at intervals, large stone tablets are extended, supported by huge blocks of stone instead of pillars. Among the buildings totally destroyed by the rebels was the far-famed Porcelain Tower. It was erected by the emperor Yungloh, to reward the kindness of his mother; the work was commenced in the 10th year of his reign (1418), at noon, on the 16th day of the moon, in the sixth month of the year, and was completed in nineteen years. The board of works was ordered, according to the plan of the emperor, to build a tower nine stories high, the bricks and tiles to be glazed, and of "blue colors;" and it was to be superior to all others, in order to make widely known the virtues of his mother. Its height was to be 322 feet. The ball on its spire was to be of brass, overlaid with gold, so that it might last forever and never grow dim. From its eight hooks as many iron chains extended to the eight corners of its highest roof; and from each chain nine bells, suspended at equal distances apart; these, together with eight from the corners of each projecting roof, amounted to 144 bells. On the outer face of each story were 16 lanterns, 128 in all; which, with 12 in the inside, made 140. It required 64 cattles of oil to fill them. On the top of the highest roof were two brazen vessels, weighing together 1900 pounds, and a brazen bowl besides, weighing 600 pounds. Encircling the spire were nine iron rings, the largest being 68 feet in circumference, and the smallest 24 feet, altogether weighing nearly 5000 pounds. In the bowl on the top were deposited one white shining pearl, one fire-averting pearl, one wind-averting pearl, one water-averting pearl, one dust-averting pearl, a lump of gold weighing 50 ounces, a box of tea-leaves, 1000 taels of silver, one lump of ornament, altogether weighing 4000 pounds; one precious stone-gem, 1000 strings of copper coin, two pieces of yellow satin, and four copies of Buddhist classics. N. continued in possession of the Taeping rebels till the successes of the troops under Major Gordon had crushed one after another all their outlying forces, when at length, on the 19th of July 1864, the city was stormed by the imperialist soldiers under the viceroy Tseung Kwo-fan. The last blow was thus dealt to the Taeping rebellion, whose principal leader perished by his own hand amid the blazing ruins of the palace he had occupied for eleven years. Since its recapture, N. has resumed its former position as the seat of the vice-regal government, but shews few signs of revival from its desolation. It has, however, been made the headquarters of a large military force, and also of an arsenal for the manufacture of cannon and other warlike stores on the European model. Although specified in the Treaty of

Tientsin (1858) as a river-port to be opened, no steps have been taken to proclaim it one.—Dr Macgowan, "North China Herald," and "Treaty Ports of China and Japan" (1867).

NANTES, (anc. *Namnetes*, or *Nannetes*), an important seaport town of France, capital of the department of Loire-Inférieure, is situated on the right bank of the Loire, 30 miles from its mouth, and at the point of confluence with it of the Erdre and the Sèvre-Nantaise, both navigable streams. Besides railways, there is communication with the interior by steamers on the Loire. The natural beauties of the site have been much improved by art, and now, the noble river on which the town is placed, covered with craft of every size and description, the islands that stud its channel, the meadows that skirt its banks, and the bridges (upwards of 16 in number) that cross it and its tributaries here, combine to make the scene a highly picturesque one. N. contains numerous squares and churches. Several districts of the town are nearly as fine as the best districts of Paris, the old town having been pulled down between 1865 and 1870. This town possesses numerous striking and beautiful buildings; among which the cathedral of St Pierre, containing the splendid monument of Francis II., the last Duke of Bretagne, and of Marguerite, his wife; and the old castle, the temporary residence of most of the kings of France since Charles VIII., and built in 938, are the chief. There is a public library containing 50,000 vols.; a museum of paintings; and a museum of natural history. The quays, lined on one side with houses, and in some cases planted with trees, afford an agreeable and interesting promenade of about two miles in length. The most beautiful promenade, however, formed by the Cours St Pierre and the Cours St André, extends from the Erdre to the Loire. It is planted with four rows of trees, bordered with lines of palatial houses, and ornamented with statues. The harbor, 1968 yards in length, is capable of accommodating upwards of 500 vessels. Formerly, vessels of no more than 200 tons could reach the port, all vessels of greater burden unloading at Palmbœuf, at the mouth of the river; but within recent years, much has been done by dredging for the improvement of the river-bed, and large vessels can now reach the harbor. The chief manufactures of N. are varieties of linen and cotton fabrics, calicoes, flannels; musical, mathematical, and optical instruments; refined sugar and salt; chemical products, cordage, &c. It contains tanneries, copper foundries, brandy distilleries, &c., and numerous establishments engaged in the various manufactures to which a port gives rise, as ship-building, the preparation of preserved meats, &c. In 1872, the imports of N. were valued at 70,000,000 of francs, the exports at 66,000,000. Population in 1876, 116,093.

NANTES, Edict of, the name given to the famous decree published in that city by Henry IV. of France, 13th April 1598, which secured to the Protestant portion of his subjects freedom of religion. Among its more important provisions were—liberty to celebrate worship wherever Protestant communities already existed; to establish new churches, except in Paris and the surrounding district, and in the royal residences; and to maintain universities, or theological colleges, of which they had four, those at Montauban, Saumur, Montpellier, and Sedan; adherents of the Reformed faith were also to be eligible to all civil offices and dignities; but, on the other hand, they were not allowed to print books on the tenets of their religion, except in those places where it existed; and they were obliged to outwardly celebrate the festivals of the Catholic Church, and to pay tithes to the Catholic priesthood. From this period the Reformers or Huguenots (who then counted 760 churches) had a legal existence in France, but gradually their political strength was crushed by the mighty genius of Richelieu—who, however, never dreamed of interfering with their liberty of worship. Neither did his successors, Mazarin and Colbert; but under the influence of a "penitence," as corrupt and sensual as the sins which occasioned it, Louis XIV., after a series of detestable *Dragonnades* (q. v.), signed a decree for the revocation of the edict, 18th October, 1685.—The result of this despotic act was that, rather than conform to the established religion, 400,000 Protestants—among the most industrious, the most intelligent, and the most religious of the nation—quitted France, and took refuge in Great Britain, Holland, Prussia, Switzerland, and America. The loss to France was immense; the gain to other countries, no less. Composed largely of merchants, manufacturers, and skilled artisans, they carried with them their knowledge, taste, and aptitude for business.

Nantucket  
Naphtha

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From them England, in particular, learned the art of manufacturing silk, crystal glasses, and the more delicate kinds of jewellery.

**NANTUCKET**, an island and town upon it, on the south-east coast of Massachusetts. The island is 15 miles long and an average of 4 wide, with an area of 80 square miles. It was bought from the Indians by Thomas Macy, in 1659, for £20 and two beaver-hats. N. was at one time a great seat of the whale fishery, having in 1775 had as many as 150 whaling vessels; but this branch of industry has declined since 1846, and since the civil war has become extinct. The harbor is commodious and safe. N. has 2 newspapers; pop. (1870) 4123.

**NA'NTWICH**, a small market-town of Cheshire, England, on the Weaver, 30 miles south-east of Chester. Many of its houses are interesting from their age and construction, being built in many cases of timber and plaster, and with overhanging upper stories. The parish church, one of the finest country churches in England, was thoroughly restored in 1864 at great cost. N. was famous in former times for its brine-springs and salt-works. Shoes, gloves, and cotton goods are manufactured, and mailing is carried on. Pop. (1871) 6673.

**NA'OS** (Gr. a dwelling), the cell or enclosed chamber of a Greek temple.

**NA'PHTHA** is derived from the Persian word *nafta*, to exude, and was originally applied to an inflammable liquid hydrocarbon (or rather a mixture of several hydrocarbons) which exudes from the soil in certain parts of Persia. (According to Pelletier and Walter, it consists of three hydrocarbons—viz.,  $C_{12}H_{18}$ , which boils at  $190^{\circ}$ ;  $C_{16}H_{22}$ , which boils at  $239^{\circ}$ ; and  $C_{20}H_{32}$ , which boils at  $314^{\circ}$ .) The term is, however, now used not only to designate a similar and almost identical fluid, that issues from the ground in many parts of the world, and is known as petroleum, rock-oil, &c., but is also applied to other liquids which resemble true naphtha in little else than in their volatility and inflammability. Thus, wood-spirit or methylic alcohol is often spoken of as *wood-naphtha*, and acetone is sometimes described as naphtha. Coal-tar yields by distillation a liquid which has a heavier specific gravity and a lower boiling-point than Persian naphtha, but resembles it in general properties, and can generally be substituted for it. See **GAS-TAR**.

Crude Naphtha, whether occurring as a natural product, or as obtained from coal-tar, is purified by agitation with strong sulphuric acid; after which it must be well washed with water (in which it is quite insoluble), and finally distilled from quicklime. Pure naphtha is colorless, and of a peculiar taste and odor; it is soluble in about eight times its bulk of alcohol, and dissolves in all proportions in ether and in the essential oils. Hot naphtha dissolves phosphorus and sulphur, but deposits them on cooling. It is an excellent solvent for gutta-percha, caoutchouc, camphor, and fatty and resinous bodies generally; and hence it is extensively used in the arts for these purposes, and its employment as a source of artificial light is now becoming universal. In consequence of its containing no oxygen, it is employed by chemists for the preservation of potassium and other metals, which have a powerful affinity for oxygen. Owing to its volatility and inflammability, it must be handled with great caution, many fatal cases having arisen from its vapor catching fire on the approach of a candle.

The principal kinds of naphtha known in commerce are native naphtha, coal naphtha, Boghead naphtha (also called paraffin oil and photogen), shale naphtha, and naphtha from caoutchouc or caoutchine.

Native naphtha, petroleum, or rock-oil, is found in many parts of the world, as in Japan, Birmah, Persia, the shores of the Caspian Sea, Siberia, Italy, France, and North America. It is of various degrees of consistency, from a thin, light, colorless fluid found in Persia, with a specific gravity of about 0.750, to a substance as thick as butter, and nearly as heavy as water. But all the kinds when rectified have nearly the same constitution. They contain no oxygen, and consist of carbon and hydrogen compounds only. Bitumen and asphaltum are closely allied substances in a solid or semi-solid form. From a very early period in Persia and Japan, and at least since last century in Italy, native naphtha has been used to burn in lamps.

Coal-tar naphtha (see **GAS-TAR**), as stated above, is of a higher specific gravity than native naphtha—viz., from 0.860 to 0.900, and has a more disagreeable and penetrating odor.

Paraffin oil, for some time known also as Boghead naphtha, has become, of late years, so important a manufacture, that a brief history of its origin cannot be uninteresting. In the year 1847, Mr James Young, now of the Bathgate Chemical Works, had his attention called to a petroleum spring at Alfreton, in Derbyshire, from which he distilled a light thin oil for burning in lamps, obtaining at the same time a thicker oil, which was used for lubricating machinery. After a year or two the supply began to fail, but Mr Young, noticing that petroleum was dropping from the sandstone roof of a coal-mine, conjectured that it originated by the action of heat on the coal-seam, the vapor from which had condensed in the sandstone, and supposed from this that it might be produced artificially. Following up this idea, he tried a great many experiments, and ultimately succeeded, by distilling coal at a low red-heat, in obtaining a substance resembling petroleum, which, when treated in the same way as the natural petroleum, yielded similar products. The obtaining of these oils and the solid substance paraffin from coal formed the subject of his now celebrated patent, dated October 17, 1850.

In the years 1860 and 1864, long and costly litigations as to the validity of Mr Young's patent took place in Edinburgh and London, resulting in the main in his favor. Many years ago, Reichenbach had, by distilling 100 lbs. of pit-coal, obtained nearly two ounces of an oily liquid exactly resembling natural naphtha; and various other chemical writers were appealed to, as proving that methods substantially the same as Mr Young's were previously known and practised. One thing seems to have been admitted, that previous to his patent, no one had succeeded in producing the oil on a commercial scale.

The processes by which the oil and paraffin are obtained are simple. The material best adapted for the purpose was for years believed to be Bog-head coal, a very rich gas-coal, occurring in a field of limited extent near Bathgate in Linlithgowshire. All cannel coals, however, give the same products, and some of them in nearly as large quantity; but, as stated below, shale is now generally used and treated in the same way. The coal is broken into fragments like road-metal, and gradually heated to redness in cast-iron retorts, which are similar to those used for coal-gas (see Gas). The retorts are most usually upright, about 10 feet long and 14 inches in diameter at the bottom, tapering to 12 inches at the top, and built in sets of 3, 4, or 6, so that one fire may heat each set. The coal is fed by means of a hopper on the top of the retort, and after passing through it at a low red-heat, is drawn out as coke at the bottom, where there is a water lute to prevent the escape of oil or gas. There is a spherical valve in the hopper, counterpoised with a weight, which closes the retort at the top. The volatile matters distilled from the coal are conducted by a pipe to the condensers (similar to those used for coal-gas), where they are condensed into a thick black oil, of a specific gravity of about 0.900, along with a little water. Great care is necessary to prevent the heat from becoming too high, because gas and gas-tar, and not paraffin oil, are obtained when coal or shale is distilled at a high temperature. A ton of Boghead coal gave about 120 gallons of crude oil.

The crude oil from the first distillation is then distilled again in long cylindrical malleable-iron stills. From this second distillation a "green oil" is obtained, and the residue is removed as coke from the bottom of the still. This oil is then mixed with from 5 to 10 per cent. of sulphuric acid, and afterwards with about the same quantity of soda, the mixture being made in circular tanks with revolving stirrers. Both the acid and the soda mix with impurities, which fall to the bottom as heavy tarry matters, and are run off by a stop-cock, till only the clear supernatant oil remains. After being so far purified, the oil undergoes three further distillations, being at the same time treated with strong acid (1 per cent.) and soda. The final result is, that a small quantity of light naphtha is obtained in the later distillations, three-fourths of what is left being a light and nearly colorless oil used for burning in lamps, and the remainder a thicker oil containing paraffin. This latter portion is pressed in a hydraulic press, which squeezes out the greater portion of the paraffin, leaving an oil which is sold for lubricating machinery.

The crude paraffin, after being subjected to hydraulic pressure three or four times is chiefly purified, by repeated crystallisations, from naphtha. Steam is afterwards blown through it in a melted state, and when finally treated with 8 per cent. of animal charcoal, it is an exquisitely beautiful substance, resembling the purest white wax. It is largely manufactured into candles, which equal, or even excel, in

**Naphthalic**  
**Napier**

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appearance those made from wax, and are only about half as costly. Paraffin has now a number of curious minor applications.

Shale naphtha, or "shale-oil," is a substance which has been manufactured, for many years, from bituminous shales both in England and on the continent. Partly because the Boghead coal has become practically exhausted, but chiefly because the volatile products from it are more easily purified than from any coal, beds of bituminous shale found in the carboniferous formation are now almost entirely used in Scotland as the raw material from which paraffin oil and paraffin are obtained. Previous to 1856, these shales were turned to no account. See SHALE.

Naphtha from caoutchouc, or caoutchine, is obtained from caoutchouc by destructive distillation. In composition it consists mainly of hydrocarbons, having the same proportion of carbon to hydrogen as india-rubber. Caoutchine has the reputation of being one of the best known solvents for india-rubber.

Until the discovery of the Pennsylvanian, the Burmese (Rangoon) petroleum or rock-oil was one of the best known. It is obtained in a treacherous state, by sinking wells about sixty feet in the soil, and consists of several fluid hydrocarbons, with about ten or eleven per cent. of the solid hydrocarbon paraffin. The different naphthas it contains are highly prized as burning and lubricating oils, and for removing greasy stains, on account of their agreeable smell. The naphtha which is found abundantly at Baku, on the shores of the Caspian Sea, closely resembles the Rangoon in its qualities. The Persian naphtha is frequently pure enough for burning without rectification.

Prominent among the wonders of our time, however, as regards new fields of industry and wealth, stand the discoveries of the naphtha, or, as they are called, the petroleum regions of the United States. Some of these sources of native naphtha were known to the Indians, by whom it was at one time collected for sale; but it is little more than twenty years since, by sinking deep wells, the great extent of the oil-bearing strata became known. The principal supplies are obtained in Pennsylvania, West Virginia, and Ohio, a considerable quantity being also obtained in West Canada. Other regions in North America produce it, but the Pennsylvanian yield is six or seven times greater than all the rest put together. Consul Korrigh, in his report on the states of Pennsylvania, Ohio, &c., for 1870 and 1871, says: "The oil regions are 100 miles in length by 30 to 50 in breadth, and the number of wells to be tapped so great, that the supply is considered to be sufficient for a century to come at least."

Much curiosity exists respecting the origin of these great natural sources of petroleum. It seems to be the general opinion of geologists that it has in most cases been produced by the decomposition of both vegetable and animal matters. In this respect it differs from coal, which has arisen from the decay of vegetable matter alone. It would appear that the Pennsylvanian oil proceeds from shales of carboniferous age; the Canadian, from those of Devonian age. In both countries the oil is found in cavities in sandstone, and has therefore been derived from subjacent rocks. It is now known that petroleum has formed in rocks of nearly all geological ages. Professor Dana, the American mineralogist, says that the conditions favorable to the formation of native naphtha, as shewn by the characteristics of the deposits in which it is found, are: (1) the diffusion of organic material through a fine mud or clay; (2) the material in a very finely divided state; and (3), as a consequence of the preceding, the atmosphere excluded as far as possible from the material undergoing decomposition.

In Pennsylvania the first borings for petroleum took place in 1859, and in that year 89,000 barrels (reckoned at 43 gallons each) were obtained; in 1861, the produce had reached 2 million barrels; and since then, as a rule, it has increased from year to year. In 1872, the total produce of North America was 7,394,000 barrels; Canada furnishing 530,000 barrels. In the same year the total exports from the United States of refined petroleum amounted to 2,951,310 barrels, an enormous quantity, considering the first exports took place so recently as 1861. Of late years, the petroleum trade is said to have employed in North America as many hands as coal-mining and the working of iron.

In 1862 and 1871, acts of parliament were passed limiting the amount of petroleum to be kept in store, and regulating the sale of such kinds as give off an inflam-

mable vapor below 100° F. There are special warehouses for the reception of petroleum at the London and Liverpool docks.

Terrible accidents have now and then happened with some of the more inflammable American oils, by reason of their vapors exploding in the reservoirs of lamps. Most of these have, no doubt, taken place with oils whose vapors form an explosive mixture with air at a temperature below 100° F., but they can hardly be considered safe if their vapors will take fire on the approach of a light at less than 120° F. The vapor of the paraffin oil prepared for illuminating purposes by Young's Mineral Oil Company, and no doubt by other firms, from Scotch shale, will not form an explosive mixture below 120° F., and it is therefore quite safe. Since this oil has to compete with petroleum, such a standard can only be kept up at a loss, and there is therefore a great temptation to keep down the firing-point of these burning oils as low as possible, with a view to greater profit; and although accidents have happened with paraffin oil, as well as with American petroleum, there is little doubt that the latter cannot be so thoroughly relied upon for safety. It could easily be made so, however, if the lighter hydro-carbons which it contains were carefully removed.

**NAPHTHALIC GROUP OR SERIES.** The starting-point of the group is *Naphthalin* ( $C_{10}H_8$ ), a substance of great interest in the history of organic chemistry, from its being that upon which Laurent chiefly founded his Theory of Substitutions. It may be obtained in various ways, but is most easily and abundantly produced from the last portions of the distillate of coal-tar, which become semi-solid on cooling. The liquid part of this mass is got rid of by pressure, and the naphthalin is then taken up by hot alcohol, from which it is obtained in a pure state by crystallization and sublimation.

Naphthalin crystallises in large, thin, rhombic plates, which are unctuous to the touch, and have a pearly lustre. Exposed to light under a glass covering, it gradually sublimes at an ordinary temperature in splendid crystals. It has a somewhat tar-like odor, and a pungent and somewhat aromatic taste. It fuses at 174°, and boils at 428°. Its specific gravity, in the solid state, is 1.15, and as a vapor, 4.92. It is not very inflammable, and when ignited, burns with a white smoky flame. It is insoluble in water, but dissolves readily in alcohol, ether, and the fixed and essential oils.

By acting on naphthalin with an excess of sulphuric acid, we obtain *sulpho-naphthalic acid* ( $C_{10}H_6S_2O_6 + 2Aq$ ), from which, by substitution processes, a large number of compounds are produced. With nitric acid, naphthalin yields nitro-naphthalin [ $C_{10}H_7(NO_2)$ ], dinitro-naphthalin [ $C_{10}H_6(NO_2)_2$ ], and trinitro-naphthalin [ $C_{10}H_5(NO_2)_3$ ], the group ( $NO_2$ ), or its multiples, being substituted for one, two, and three equivalents of the hydrogen of the naphthalin. The final product of the prolonged action of boiling nitric acid on naphthalin is a mixture of oxalic and *naphthalic* or *phthalic acid*; the re-action being shewn by the equation:

Naphthalin. Oxygen. Oxalic Acid. Naphthalic Acid.



This acid is also obtained by the continued action of nitric acid upon alizarin, which is an important fact, since it indicates a connection between naphthalin and the coloring matter of madder.

Laurent has discovered a very numerous series of substitution compounds formed upon the type of naphthalin, into the composition of which chlorine enters. They are of little practical importance although their investigation has exerted a remarkable influence upon the progress of organic chemistry.

**NAPIER, John, Laird of Merchiston,** was born at Merchiston Castle, near Edinburgh, in 1550, and died there on the 4th of April 1617. After attending the regular course in Arts at the university of St Andrews, he travelled for some time on the continent, and returned to his native country highly informed and cultivated for the age. Declining all civil employments, for which his many accomplishments eminently fitted him, he preferred the seclusion of a life devoted to literary and scientific study. From this time his history is a blank till 1593, when he published his "Plaine Discovery (or 'Interpretation') of the whole Revelation of St John" (Edin. 5th ed. 4to, 1645), a work displaying great acuteness and ingenuity, but, it is scarcely neces-



sary to add, not in any sense a "plaine discovery" of the apocalypse. In the dedication to King James VI., he gave his majesty some very plain advice regarding the propriety of reforming his "house, family, and court;" and on republishing the work, he added a supplement, resolving "certaine doubts mooved by some well-affected brethren." About this time he seems to have devoted much of his time to the invention of warlike machines, but these inventions were never perfected, probably from motives of humanity. Like other eminent men of the time, N., though a strict Presbyterian, seems to have been a believer in astrology and divination, but there is no satisfactory proof that he ever practiced these arts. In 1596, he proposed the use of salt as a fertiliser of land, an idea which, though scouted at the time, is now generally received. Another large blank in his history here occurs, and terminates in 1614, at which date he first gave to the world his famous invention of Logarithms (q. v.), in a treatise entitled "*Mirifici Logarithmorum Canonis Descriptio*" (4to, Edin.). This was followed by another work, "*Rab-dologice, seu numerationis per Virgulas libri dus*" (Edin. 1617), detailing an invention for simplifying and shortening the processes of multiplication and division. See **NAPIER'S BONES**. He also prepared a second work on Logarithms, shewing their mode of construction and application, with an appendix containing several propositions of spherical trigonometry, and those formulæ which are now known by his name. This work was published after his death by his son Robert, under the title of "*Mirifici Logarithmorum Canonis Constructio, &c., quibus accessere Propositiones ad Triangula spherica facilloro calculo resolvenda, &c.*" (Edin. 1619), and occurs along with the "*Canonis Descriptio*." The latter work is included in Baron Masere's extensive collection, the "*Scriptores Logarithmici*" (Lond. 1808). N.'s eldest son, Archibald, was raised to the peerage as the first Lord Napier by Charles I. in 1627, and his descendants still bear the title. Two lives of N. have been published, the one by the Earl of Buchan (1781), and the other by Mr Mark Napier (1834).

**NAPIER**, Sir Charles James, G.C.B., English general, one of several brothers distinguished for their bravery, three of whom—Charles, William, and George—were known in the Peninsular War as "Wellington's Colonels." They were sons, by a second marriage, of Hon. Colonel George Napier, grandson of Francis, fifth Lord Napier, who was fifth in descent, but through two females in succession, from the inventor of Logarithms. Charles, the eldest was born at Whitehall, Westminster, August 10, 1752. Before he had finished his twelfth year, young N. received a commission in the 22d Foot. His first service was in Ireland, where he assisted in putting down the rebellion. He commanded the 50th Foot during the retreat on Corunna; and at the fatal battle in which Sir J. Moore fell, he was wounded in five places and made prisoner. Marshal Ney dismissed him, with permission to go to England on parole. On his return, he engaged in literary works, and even wrote an historical romance. In 1811, he returned to the Peninsula. At Coa, where he fought as a volunteer, he had two horses shot under him. At Busaco, he was shot in the face, having his jaw broken and his eye injured. He recovered in time to be present at the battle of Fuentes d'Onoro and the second siege of Badajoz. After distinguishing himself in innumerable skirmishes, the daring soldier returned to England. He next took part in a fighting cruise off the Chesapeake, capturing American vessels, and making frequent descents upon the coasts. He did not return to Europe soon enough for Waterloo, but was engaged in the storming of Cambrai, and accompanied the army to Paris. After the peace he was, in 1818, made governor of the island of Cephalonia, the affairs of which he administered with great energy and intelligence. Being, however, of an excessively combative disposition, he became embroiled with the authorities at home. In 1841, he was ordered to India to assume the command of the army at Bombay. This was the most splendid period of his career, resulting in the conquest of Scinde against terrible odds. His destruction of a fortification called Emaan Ghar in 1843, was described by the Duke of Wellington as one of the most remarkable military feats he had ever heard of. The fearful battle of Meanee followed, where N., with 1600 English and sepoys, defeated near 30,000 Beloochees, strongly posted, with the loss of 6000 men. The Ameers surrendered, except Shere Mahomed, who brought 25,000 men into line of battle at Hyderabad. N. had only 5000 men, but in three hours his little army gained a decisive victory. A few days afterwards, N. was in the palace of the Ameers, and

master of Scinde. He was fortunate in possessing the entire confidence of Lord Ellenborough, who made him governor of Scinde. His civil administration was scarcely less remarkable or less successful than his military operations. He gained the respect and reverence of the inhabitants, but soon became engaged in an acrimonious war of despatches with the directors. In 1847, he returned to England. After attending a series of festivals in his honor, he lived in retirement until the disasters of the last Sikh war caused the eyes of his countrymen to be turned to the hero of Scinde as the deliverer of our Indian empire. He went to India, but found on his arrival that the Sikhs had been routed. He now turned his attention, as commander-in-chief of the army in India, to the subject of military reform. He bade a final adieu to the East in 1851, and returned to his native country, where he resided until his death, which took place at his seat, at Oaklands, near Portsmouth, August 29, 1853. He had then attained the rank of lieutenant-general, was G.C.B., and colonel of the 22d Foot. It must be remembered to his honor that he was the first English general who ever recorded in his despatches the names of private soldiers who had distinguished themselves, side by side with those of officers. Brave to rashness, ready alike with tongue, pen, and sword, quarrelsome with his superiors, but beloved by his soldiers, and, to crown all, of a strangely wild yet noble and striking appearance, N. was one of the most remarkable men of his time, and in losing him the country lost one of its brightest military ornaments. His statue was, after his death, erected in Trafalgar Square. The story of his "Conquest of Scinde" has been written by his brother, Lieutenant-General SIR WILLIAM FRANCIS PATRICK NAPIER, K.C.B., born 17th December 1785, who served in the Peninsular campaign, and was engaged from 1824 to 1840 in preparing his "History of the Peninsular War," the greatest military history in the English language. He died February 12, 1860, at Scinde House, Clapham, and was followed in a few weeks to the tomb by his wife, Lady Napier, niece of the great C. J. Fox. Her extraordinary skill in translating French documents written in cypher, and her indefatigable labors as her husband's amanuensis, are touchingly commemorated in the preface to the edition of the "History of the Peninsular War," published in 1851.

NAPIER, Sir Charles, K. C. B., English admiral, was cousin to the hero of Scinde and the historian of the Peninsular War. His father was the Hon. Captain Charles Napier, R. N., second son of Francis, fifth Lord Napier. He was born March 6, 1784, at the family seat, Merchiston Hall, in the county of Stirling. At 18, he went to sea as a naval volunteer. In 1808, he received the command of the *Recruit*, 18 guns, and had his thigh broken by a bullet. He kept up a running fight, in his 18-gun brig, with the rearmost of three French line-of-battle ships, the *D'Hautpoult*, which escaped from Guadeloupe, and was thus instrumental in her capture. This obtained him a post-captaincy; but being thrown out of active service, he served ashore as a volunteer in the Peninsular army, and was wounded at Busaco. Commanding the *Thames* in 1811, he inflicted an incredible amount of damage upon the enemy in the Mediterranean, and also conducted several desperate land operations with marked success. In 1814, he was ordered to America, and led the way in the hazardous ascent and descent of the Potomac. He afterwards took an active part in the operations against Baltimore. In 1822, he received the command of the *Galatea*, a 42-gun frigate, and was employed on "particular service" on the coast of Portugal. Becoming acquainted with the leaders of the Constitutional party, he accepted the command of the fleet of the young queen; and by defeating the Miguelite fleet, he concluded the war, and placed Donna Maria on the throne. He was made admiral-in-chief of the Portuguese navy, and attempted to remodel it; but official and corrupt influence was too strong for him, and he returned to England. In the war between the Porte and Mehemet Ali, he organized a land force, with which he stormed Sidon, and defeated Ibrahim Pasha among the heights of Mount Lebanon. He took part in the naval attack on Acre, and did not hesitate to disregard the orders of his chief, Admiral Stopford, when he saw the way to bring the battle to a speedy termination. He next blockaded Alexandria, and concluded a convention with Mehemet Ali. In 1847, he received the command of the Channel fleet. When the Russian war broke out, he was sent out to command the Baltic fleet; but the capture of Bomarsund failed to realise the high expectations formed of N.'s exploits. He twice sat in parliament, and, until his death, November 6, 1860, he labored with

Napier  
Naples

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success to reform our naval administration. He was at the time of his death a vice-admiral and a knight of several foreign orders.

**NAPIER**, The Right Hon. Sir Robert Cornelis, Baron Napier of Magdala, was born in Ceylon, 6th December 1810, and was educated at the Military College at Addiscombe. He entered the Bengal Engineers in 1830, served in the Sutlej campaign, was wounded while acting as chief engineer at the siege of Moultan, and had a prominent share in the battle of Gujerat. As chief engineer of the Punjab, with the rank of colonel, he greatly developed the resources of the country. During the Indian mutiny, he was chief engineer in Sir Colin Campbell's army, and especially distinguished himself at the siege of Lucknow. For his services in the Chinese war of 1858, he was made major-general and K.C.B. As commander of the expedition in Abyssinia in 1868 he achieved a brilliant success, both by his whole management of the short campaign and in the storming of Magdala, which ended it. On his return he received the thanks of parliament, an annuity of £3000 and a peerage. In 1870, he was appointed Commander-in-chief of the forces in India, and nominated a member of the Indian Council. In 1877 he was made governor of Gibraltar.

**NAPIER'S BONES**, an invention of the celebrated Napier (q. v.) of Merchiston, for the purpose of performing mechanically the operations of multiplication and division. The "bones" were narrow slips of bone, wood, ivory, or metal, about 3 inches long by 3-10ths of an inch in breadth, and divided by transverse lines into nine compartments; each of these compartments being divided into two portions by a diagonal line running from the upper right hand to the lower left hand corners. The "bones" were divided into sets, all those of one set having the same digit occupying the top compartment, and the several multiples of that digit occupying in order the eight lower compartments; when the multiple consisted of two figures, these were placed one on each side of the diagonal line. There was necessarily a set of bones for each digit. There was also another rod similarly divided into compartments, in which were placed the nine digits; this was called the *index-rod*. Multiplication was performed as follows; e. g., if 6795 is to be multiplied by 97324, four rods whose top digits were 6, 7, 9, 5 are selected and arranged in the order of the figures in the multiplicand, and the index-rod placed alongside them, as in the figure; the several figures of the multiplier are then sought for on the index-rod, the two lines of figures opposite each figure on the index are then added together diagonally, and the five sums thus obtained are arranged as follows:

9	61155
7	47565
8	54360
3	20385
4	27180

664782030 = the product required.

Division is performed in an analogous manner. The contemporaneous invention of logarithms for the same purpose of converting multiplication and division into addition and subtraction, caused Napier's bones to be overlooked, and they are now scarcely ever used.

**NAPLES** (Ital. *Napoli*, anc. *Neapolis*), a city of Southern Italy, capital of the province of Naples, is built partly at the base, partly on the slopes of two crescent-shaped acclivities on the famous bay of the same name. Pop. (1872) 448,335. Lat. 40° 51' 8" N., long. 14° 15' 5" E. The wonderful beauty of the site and of the surrounding prospect, the delicious softness of the climate, and the clear atmosphere, make N. famed among the cities of the world. It is one of the chief centres of commerce and industry of Italy, possesses a very extensive mercantile shipping, and is one of the principal stations of Mediterranean steam-navigation.

The public buildings of Naples are numerous and grand, but are devoid of architectural symmetry in consequence of the antiquity of their origin and the irregularity of their site. Many of the old streets are paved with lava, and inconveniently narrow, with houses of great height. The modern streets, however, are spacious and splendid. The city is divided into the Old and the New Town, or the East and

West Crescent, by a lesser range of heights—viz., the Capodemonte, the St Elmo, and the Pizzofalcone, terminating in the rocky promontory called the Castel dell' Ovo. In 1688, a landslide destroyed a number of houses at the foot of Pizzofalcone. The eastern division of N. is the most ancient and the most densely peopled; it contains the principal public structures, and is intersected by the splendid Via or Street di Toledo. The western, or modern section, contains the famous Riviera di Chiaia, or the Quay, a fine road running along the bay in a curved course of three miles, flanked on the right by a row of palaces, and bordered on the left by the beautiful pleasure-grounds of the Villa Reale, which lie between it and the sea, and of which the natural beauty is heightened by the interspersions of temples, fountains, and statuary groups amidst the acacia, myrtle, and orange groves. The public squares, or *larghi*, of N. are adorned with fountains and obelisks; and within the precincts of the city, there are several highly-prized springs both of fresh and mineral waters. The fortified castles are numerous. Amongst the principal are the Castel Nuovo, called the Bastile of Naples, somewhat similar to the Tower of London, and adorned with a fine triumphal arch, erected in honor of Alfonso of Aragon; the Castel dell' Ovo, so called from its oval or egg shape, standing on a promontory, and connected by a bridge with the mainland; the Castel Sant' Elmo, commanding a magnificent view from its ramparts, and formerly of immense strength; and the dismantled Castle del Carmine. The churches are upwards of 800, and many are rich in architectural and archeological interest. The cathedral dedicated to St Gennaro (Januarius; q. v.) contains the celebrated phials in which the liquefaction of St Gennaro's blood is alleged to take place on two annual festivals; it also contains the tombs of Charles of Anjou and of Pope Innocent IV., besides numerous fine paintings and statues. The educational institutions of N. embrace famous schools of surgery, law, and general science. A magnificent aquarium has been opened since 1871, with a zoological laboratory in which many distinguished foreign naturalists are at work. The philanthropical establishments are on an immense scale, and are richly endowed. There are also several theatres in the city, of which that of *San Carlo* (devoted to the Opera) is one of the largest and most celebrated in Italy; but the characteristic theatre of N. is the *Teatro di San Carlino*, the headquarters of *Pulcinella* ("the Italian Punch." There are four grand public libraries; and in the Museo Borbonico, N. contains an unrivalled collection of art, comprising frescoes, paintings, mosaics, sculptures, bronzes, antiquities, coins, medals, inscriptions, and the renowned collection of precious objects excavated from Herculaneum and Pompeii.

The environs of N., apart from their extreme beauty of scenery, are highly interesting. The locality which contains the tomb of Virgil, the disinterred towns of Herculaneum and Pompeii, Vesuvius (from an eruption of which N. suffered in 1872), and the Roman remains, must possess an inexhaustible source of interest for scientific, antiquarian, and classical investigators. The modern villas of N. are splendid and luxurious. One of the most striking features of N. is its unique population and the universal publicity in which life is passed. The inhabitants forever swarm in the thoroughfares, where an incessant throng of vendors, purchasers, and idlers intermingle with asses, mules, hand-carts, and conveyances, dazzling the eye with their brilliant variety of costume, and the pantomimic expressiveness of their frantic gestures and attitudes; while the ear is stunned by the shrill conflicting cries of the ambulatory vendors of every conceivable commodity, by the piercing notes of the improvisatore's song, and the uproarious hilarity and high-pitched shouts of the countless masses, whose sole abode appears to strangers to be the thronged public squares and streets. The popular language of N., which is a corrupt dialect of Italian and Spanish, is in prevalent use among all classes of society; it lends itself especially to the satirical and facetious equibs and compositions in which the Neapolitans excel. The popular Neapolitan songs in the native patois are exquisitely naïve and expressive in sentiment, and are set to popular melodies which exert a maddening charm over this southern populace. The physical condition of the lower classes of N., and especially of the *lazzaroni* (q. v.), has of late years sensibly improved both as regards raiment and lodging.

The name Naples (Gr. *Neapolis*, new city) had reference to an older town in the neighborhood, called originally Parthenope, and, after the foundation of the new town, *Palaepolis* (old town), which was situated most probably on the ridge called *Pasillipo*, that separates the Bay of Pozzuoli or Baïæ from that of Naples. Both

Naples  
Napo.eon

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towns were Greek settlements, apparently colonies from the neighboring Cumæ, joined by immigrants direct from Greece. In 337 B.C., Paleopolis was besieged and taken by the Romans, and thenceforth disappears from history; Neapolis submitted without resistance, and became a favored and faithful ally, or rather provincial city of Rome. It long, however, retained its purely Greek character and institutions; and there is evidence that the Greek language continued to be used, even in public documents, as late as the 2d c. of the Christian era. N. was a flourishing and populous city during the Roman empire; and notwithstanding the vicissitudes of the Gothic conquest of Italy, and the reconquests by the Byzantine emperors, it continued to be one of the most important and opulent places in Italy. About the 8th c., it threw off allegiance to the Byzantine emperors, remained independent till it fell into the hands of the Normans in 1140 A.D., and became the capital of the kingdom of Naples.

**NAPLES**, Bay of, an indentation of the Mediterranean Sea on the south-west coast of Italy, opposite the city of Naples, is 20 miles wide from Cape Miseno on the north-west to Cape Campanella on the south-east, and from this line extends inland for about ten miles. The scenery is very beautiful. On the shores are many towns and villages; the prospect is bounded on the east by Mount Vesuvius, and on the outskirts of the bay are the islands of Iachia and Capri.

**NAPLES**. The Italian provinces (formerly kingdom) of N. and Sicily, or the Two Sicilies, occupy the south end of the Italian peninsula, and consist of the continental territory of N. and the insular dependency of Sicily. The distinctive physical features of N. and Sicily are noted under the names of the different provinces of Italy and in the article SICILY. They are favored by nature with a salubrious and almost tropical climate, unbounded fertility, and teeming population; and they present natural features of rare attractiveness. The rural population are an acute, frugal, and laborious race, and form a strong contrast to their idle and debased brethren of the towns. For statistics of products, exports, and population, see ITALY and SICILY. N., in ancient times, was divided into numerous petty states independent of each other, and its inhabitants were of various races. Many of these states arose from Greek colonies, which had been founded in the country previous to the 5th c. B.C. The ancient historical importance of N. is attested by the splendor of its cities, and the warlike renown of its population. On its conquest by the Romans, the great Neapolitan cities severally adopted the municipal, federative, or colonial form of government, and gradually assimilated their laws and customs to those of their conquerors. After the downfall of the Western Empire, N. was seized by Odoacer, but soon afterwards, (490 A.D.) it was subjected by the Goths, and in the following century by the Lombards, who established in it various independent duchies, as Benevento, Spoleto, Salerno, Capua, &c. Most of these were overthrown by invading bands of Arabs, Saracens, and Byzantines, who were in turn expelled, and the whole country subdued by the Normans in the 11th century. The Normans subsequently erected N. and Sicily into a kingdom, and established a new political, ecclesiastical, and military system. To the Norman dynasty succeeded that of the Hohenstaufen, whose rule was marked by an immense intellectual and social advancement of the people; but the vindictive enmity with which the papal see regarded this dynasty, led to the invasion of N. by Charles of Anjou, who, notwithstanding the heroic resistance of King Manfred (q. v.), by the battle of Benevento (1266) annihilated the power of the Hohenstaufen. The ascendancy of Charles of Anjou was further effectually secured by the treacherous defeat and decapitation (1268) of Konradin (q. v.), the last male heir to the throne. By the *Sicilian Vespers* (q. v.) the island of Sicily was, however, wrested in 1283 from his grasp, and became an appanage of the Spanish crown. The predominance of the Neapolitan Guelph or papal party during the glorious reign of Robert I., who was the patron of Dante and Boccaccio, the depraved libertinism of his heirs and granddaughter Joanna, the fearful ravages committed by predatory bands of German mercenaries and by the plague, the futile attempts of the Anjou sovereigns to recover Sicily, and the envenomed feuds of rival claimants to the throne, are the leading features of the history of N. during the rule of this dynasty, which expired with the profligate Joanna II. in 1435; and was followed by that of Aragon, which had ruled Sicily from the time of the Sicilian Vespers. During the tenure of the

Aragon race, various unsuccessful attempts were made by the House of Anjou to recover their lost sovereignty; and the country, especially near the coast, was repeatedly ravaged by the Turks (1480). In fact, after the death of Alfonso, the first ruler of the Aragon dynasty, the country groaned under a load of misery. Wars, defensive and offensive, were incessant, the country was impoverished, and a conspiracy of the nobles to remedy the condition of affairs was productive of the most lamentable results, both to the conspirators themselves, and to the other influential Neapolitan families. In 1495, Charles VIII. invaded N., and though he was compelled to withdraw in the same year, his successor, Louis XII., with the treacherous assistance of Ferdinand (the Catholic) of Spain, succeeded in conquering the country in 1501. Two years afterwards, the Spaniards under Gonsalvo di Cordova (q. v.) drove out the French, and the country from this time became a province of Spain. Sicily had previously (1479) been annexed to the same kingdom. During the two centuries of Spanish rule in N., the parliaments which had existed from the time of the Normans fell into desuetude, the exercise of supreme authority devolved on viceroys, and to their ignorance, rapacity, and oppressive administration may be solely ascribed the unexampled misery and abasement of this period. In the words of Sismondi, "no tax was imposed save with the apparent object of crushing commerce or destroying agriculture, and the viceregal palace and the tribunals of justice became public offices in which the highest dignities and most sacred interests of the state were openly bartered to the wealthiest bidder." During the Spanish rule, a formidable rebellion took place in 1647, headed first by Masaniello (q. v.), and afterwards by Henry V., Duke of Guise; the whole population of the province renounced their allegiance to their Spanish sovereigns, but the arrival of a new viceroy, who was equal to the occasion, resulted in the capture of the Duke of Guise and the re-subjugation of the country. At length, during the war of the *Spanish Succession* (q. v.), N. was wrested from Spain by Austria in 1707, and Sicily in the following year; but while N. was secured to Austria by the treaties of Utrecht (1713) and Rastadt (1714), Sicily was handed over to Savoy by the former treaty. In 1720, however, both Sicilies were reunited under the Austrian rule, and in 1735 were given to Don Carlos, third son of Philip V. of Spain, who ascended the throne as Charles I., and founded the Bourbon dynasty. His reign was marked by equity and moderation; great reforms were effected in the administration of public affairs, science and literature were encouraged, and splendid works of public utility were erected throughout the kingdom. It was during his reign that Pompeii and Herculaneum were discovered. His successor, Ferdinand IV., followed in the course of legislative reform; but on the proclamation of the French Republic (1789), his states were invaded by a French army, and the kingdom of N. was erected into the Parthenopean Republic (1799). Ferdinand retired with his court to Sicily, and for a brief period enjoyed the restoration of his sovereign rights in N.; but a second invasion by Napoleon (1806) ended in a proclamation of his brother, Joseph Bonaparte, as king of N.; and on this latter assuming the Spanish crown in 1808, that of N. was awarded to Joachim Murat, brother-in-law of Napoleon. On the defeat and execution of Murat in 1815, the Bourbon monarch, Ferdinand IV., was restored. The liberal insurrectionary movements in N. in 1821 and 1830 were the forerunners of the revolution of 1848; and in each case the party of progress was combated by the respective kings with ruthless severity, and perfidious concessions, to be cancelled and avenged with sanguinary fury when the disarmed and credulous patriots were at the mercy of the sovereigns. See article GARIBALDI for the ultimate overthrow of the Bourbon dynasty in the kingdom of N., and its subsequent annexation to the kingdom of Italy under King Victor Emmanuel; also articles FERDINAND II. and ITALY. For the history of Sicily previous to its annexation to and during its various separations from N., see SICILY.

**NAPLES-YELLOW** is a pigment used by artists. It consists of antimoniate of lead, and is obtained by the direct combination of antimonic acid and oxide of lead under the influence of heat.

**NAPOLÉON BONAPARTE**, Emperor of the French, was born at Ajaccio, in the island of Corsica, 15th August 1769. (For an account of the family to which he belonged, see **BONAPARTE, FAMILY OF**.) At the age of 10 he entered the Military

School at Brienne, as a king's pensioner. Here he remained five years and a half. During that period he displayed a great aptitude and predilection for mathematics, history, and geography, and an indifference to merely verbal and literary studies. His manner was sombre and taciturn, but as Bourrienne (who was his schoolfellow) says, this arose chiefly from the circumstance that he was a foreigner, poor and unaccustomed to the use of French, which he first learned at Brienne. In October 1784, he proceeded to the Military School to complete his studies for the army, and in rather less than a year obtained his commission as sub-lieutenant in the artillery regiment *de la Perte*. When the Revolution broke out, N. was in garrison at Valence. He took the popular side, but in a quiet and unobtrusive way, for he did not love the boisterous enthusiasm of unmanageable mobs. When the armed rabble of Paris poured out to the Tuilleries on the famous 20th of June 1792, N., who was then in the city, followed the "despicable wretches" (as he called them), along with his friend Bourrienne; he saw them force the poor king to stick the red cap on his head, and smile fatuously from the windows of his palace. "It is all over henceforth with that man," said the young officer, and returned to Paris. He was more thoughtful than Bourrienne had ever seen him. After the scenes of the 10th August, he left for Corsica, where General Paoli held the chief command. The excesses of the Septembrists and Terrorists, however, induced Paoli to throw off his allegiance to the Convention, and to seek the assistance of England. N. was active but unsuccessful in his opposition to the designs of the general, and was obliged, along with his relatives, to flee from the island.

He now petitioned the Convention for employment, and was sent to assist in the reduction of Toulon, with the rank of lieutenant-colonel of artillery. The city was captured (19th December 1793) entirely through the strategic genius of N.; and in the following February he was raised to the rank of brigadier-general, and placed at the head of the artillery in the army of the south. Later in the year, he was sent to Genoa, to examine the state of the fortifications of the city, and to discover the political disposition of the inhabitants. In the beginning of 1795, he was again in Paris seeking active employment and thinking, from sheer ennui, of transferring his services to the Sultan of Turkey. The Convention was now in great peril, on account of the mutinous spirit of the *arrondissements* of the capital, and, on the suggestion of Barras, Carnot, Tallien, and others, N. was made commander of the troops provided for its defence. On the 18th Vendémiaire (4th October 1795), the national guard, 30,000 strong, attempted to force its way into the Tuilleries, where the Convention was sitting, but was routed and dispersed by a terrible cannonade directed by the young artillery officer. N. was immediately appointed to the command of the army of the interior. About this time, he made the acquaintance of Josephine Beauharnais, whom he frequently met at the house of Madame Tallien. Captivated by her elegant manners and amiable disposition, he proposed marriage to the graceful widow, and was accepted. The ceremony took place 9th March 1796. A few days before, he had been appointed to the supreme command of the army of Italy, and he was obliged to leave his bride almost at the altar. On his arrival, he found the troops in a wretched condition. He had only 36,000 available men, and even these were half-starved, and only half-clothed, to oppose to an Austrian and Piedmontese force of 75,000. Yet he was not afraid to undertake the conquest of Upper Italy. Leaving Nice at the close of March, he won his first victory over the Austrians at Montenotte (11th April), which opened the Apennines for him; three days later, a second success at Millesimo separated the allied armies; and, finally, his victory at Mondovi (on the 22d) compelled Sardinia to implore peace. He now hoped to utterly crush the Austrian army under Beaulieu, and at the battle of Lodi (on the 10th May) nearly accomplished it. His opponent did not venture to defend the line of the Mincio, but hastily throwing a garrison into the city of Mantua, retreated into the Tyrol. N. immediately entered Milan and took possession besides of all the principal cities of Lombardy. Now began that system of enormous and unscrupulous plunder in Northern and Central Italy which gives something of a barbaric character to the conquests of the French. The Directory gave orders that N. should levy contributions from all the states which he had gratuitously freed, and according to his own account, he sent to France not less than 50,000,000 francs. His officers and commissaries actually seized whatever they wished, provisions, horses, and all manner of stores; and because Pavia ventured to make some slight resist-

ance to the shameful extortions of the Republicans, N. gave it up to havoc for 24 hours! A body of savans (including Monge, Berthollet, and others) were despatched to Italy to superintend the spoliation of its artistic treasures; and both now and in the subsequent Italian campaigns, pictures, statues, vases, and MSS. were carried off in great numbers, to gratify the vanity of the Parisian sight-seers. In this way Lombardy, Parma, Modena, Bologna, and the States of the Church were savagely harried before the end of June—Pope Pius VI., in particular, being forced to submit to conditions of extreme rigor.

Meanwhile, Austria had resolved to make another effort for the recovery of Lombardy. About the close of July, Marshal Wurmser advanced from Trent at the head of 60,000 men, forced Napoleon to raise the siege of Mantua, but was himself defeated, with the loss of all his cannon, near Castiglione (5th August), and again at Bassano (8th September), in consequence of which, he was driven to take refuge within the fortress of Mantua with some 16,000 troops—the shattered remains of his 60,000. Austria, however, was not disheartened. A third army was dispatched in two divisions: 30,000 from Carinthia, under Marshal Alvinzi; and 20,000 from the Tyrol, under General Davidowich. This was a terrible campaign for N.; his veterans were exhausted, his new recruits had not arrived; he himself was dependant, while the Austrians were fresh and hopeful. At first, the latter were completely successful; but the great victory of Arcola, won by N. (17th November), after three days' fierce fighting, in which he lost nearly all his general officers, decided the fate of the campaign. His dispatches to the Directory, penned about this period, shew how thoroughly he apprehended the state of parties in Italy, and also how utterly indifferent he was to any considerations beyond those that advanced the interests of France. In January 1797, a fourth campaign was commenced by Austria. At the head of 50,000 fresh troops, Alvinzi descended from the Tyrol, but was completely routed by N. at Rivoli, on the 14th of the month; while not long after, Wurmser was starved into surrender at Mantua. A fifth army was assembled on the Tagliamento, under the command of the Archduke Charles: but his troops were mainly raw recruits, while those of N. were leagued to war, and flushed with innumerable triumphs. In consequence, he was forced to retreat, which, however, he did slowly and in good order, hoping to surround his opponent in the interior of the country. N.'s design was to march on Vienna, and he actually penetrated as far as Jndenburg, in Upper Styria, only eight days' march from the capital. The Austrian government at length was seized with alarm, made overtures of peace; and finally, on the 17th October 1797, the famous treaty of Campo-formio was signed, by which Austria ceded the Netherlands, Lombardy, and some other smaller territories to France; while she herself obtained in return, through disgraceful treachery on the part of the victor, possession of the province of Venice. It is generally said that N.'s military genius was never more brilliantly displayed than in these early Italian campaigns. In ingenuity of plan, celerity of movement, audacity of assault, he far outshines all his adversaries; it is, moreover, but just to him to state further, that he made desperate efforts to stop the excesses of the most scoundrelly commissariat in Europe; and that while in the main he shewed no hesitation in carrying out the brigand-like orders of the Directory, he does not appear to have appropriated a single penny to himself. It was power, not gold, that he cared for.

In December 1797, N. returned to Paris, where he was received with the utmost enthusiasm. At this time, there was much talk, and probably some vague design, on the part of the Directory, of invading England, and N. was appointed commander-in-chief of the invading army. It has been thought, however, that this was merely a feint to mask the real design of the Directory, viz., the invasion of Egypt, as perhaps a preliminary step to the conquest of British India. Be that as it may, an expedition against Egypt was resolved on by the Directory; and on the 19th of May, 1798, N. sailed from Toulon, with a fleet containing 30,000 soldiers, and a body of savans to investigate the antiquities of the country. He reached Alexandria on the 20th of June. At this moment, France was at peace with Turkey; the invasion of Egypt, a Turkish dependency, was therefore an act utterly unjustifiable, and reminds us not of European warfare, but rather of the irruption of a horde of barbaric Tartars. N. having lauded his troops, captured Alexandria, and marched on Cairo. The Mamelukes presented resistance; but on the 21st July, at the battle



of the Pyramids, they were completely defeated, and the French became, in a surface-way, masters of Egypt. N. now entered the capital, and immediately commenced to reorganise the civil and military administration of the country—for he took a great, but also an ostentatious pleasure in this sort of work. Meanwhile, on the 2d of August, Nelson had utterly destroyed the French fleet in Aboukir Bay, and so cut off N. from communication with Europe. A month later, the sultan declared war against him. This was followed by disturbances in Cairo, which were only suppressed by horrible massacres. It was obviously necessary that N. should go somewhere else. He resolved to meet the Turkish forces assembling in Syria; and in February 1799, crossed the desert at the head of 10,000 men, stormed Jaffa on the 7th March, after a heroic resistance on the part of the Turks; marched northwards by the coast, and reached Acre on the 17th. Here his career of victory was stopped. All his efforts to capture Acre were foiled through the desperate and obstinate valor of old Djezzar Pasha (q. v.), assisted by Sir Sidney Smith, with a small body of English sailors and marines. On the 21st of May, he commenced his retreat to Egypt, leaving the whole country on fire behind him, and re-entered Cairo on the 14th of June. It was during his absence that the savans made their valuable researches among the monuments of Upper Egypt. About the middle of July, the Sultan landed a force of 18,000 men at Aboukir, who were attacked by N. on the 25th, and routed with immense slaughter. But the position of the victor was far from comfortable, and he therefore resolved to return to France—especially as news had come to him of disasters in Italy and confusions in Paris. On the 23d of August, he sailed from Alexandria, leaving his army behind him, under the command of Kleber; and after narrowly escaping capture by the English fleet, landed near Frejus on the 9th October. He hastened to Paris, soon mastered the state of affairs, threw himself into the party of Sieyès, and overthrew the Directory (q. v.) on the famous 18th Brumaire. A new constitution was drawn up, chiefly by Sieyès, under which N. became First Consul, with the power of appointing to all public offices, of proposing all public measures in peace or war, and the entire command of all administrative affairs civil and military. In a word, he was ruler of France; and though far from satisfied with the clumsy machinery of Sieyès's plan, he could afford to wait the future. About the end of January 1800 he took up his residence in the Tuilleries. The country was tired of revolutions, discords, and confusions; it was proud of its young leader, who seemed inspired but not enslaved by the ideas of his age, and who knew how to enforce obedience, as well as to panegyrise principles. It therefore regarded his assumption of sovereign power with positive satisfaction. N. displayed extraordinary vigor as an administrator, recruited the national treasury, by various sagacious expedients, repealed the more violent laws passed during the Revolution, such as punishment for matters of opinion, reopened the churches, and terminated by policy the Vendean struggle. But he knew well that his genius was essentially military, and that his most dazzling and influential triumphs were those won on the battle-field. France was still at war with Austria, and he resolved to renew the glories of his first Italian campaign. Leaving Moreau in command of the army of the Rhine, he assembled, with wonderful rapidity and secrecy, an army of 86,000 men on the shores of the Lake of Geneva, and on the 13th May (1800), began his magnificent and daring march across the Alps. Almost before the Austrian general, Melas, was aware, N. had entered Milan (2d June). Twelve days afterwards, was fought the fiercely contested yet decisive battle of Marengo, which compelled the Austrians to resign Piedmont with all its fortresses, and (for the second time) Lombardy to the French. Later in the year, hostilities were recommenced; but the Austrians, beaten by Moreau in Germany (at Hohenlinden, &c.), and by N. in Italy, were at last forced to make peace; and on the 9th February 1801, signed the treaty of Lunéville, which was mainly based on that Campo-formio. In the course of the same year, France and England also made peace, but the treaty (known as that of Amiens) was not definitively signed till the 27th of March 1802. Not less important for the consolidation of affairs in France was the famous "Concordat" (q. v.) between N. and Pope Pius VII., also concluded in 1801. In January 1802, N. became President of the Cisalpine Republic; and on the 2d August following, was declared Consul for life by a decree of the French senate.

Meanwhile N. was busy superintending the drawing up of a code of civil laws for

France. He assembled the first lawyers in the nation, under the presidency of Cambacérès, and frequently took part in their deliberations; the results of their labors were the "Code Civil des Français," "Code de Procédure," "Code Penal," and "Code d'Instruction Criminelle," besides commercial and military codes, all of which often go loosely under the name of the "Code Napoléon." The first of these is an admirable production, and is in force to the present day. Considerable attention was besides paid to such branches of education as were likely to promote efficiency in the public service. Mathematics, physical science in all its departments, engineering, &c., were as vigorously encouraged as philosophy, ethics, and political speculation were discouraged. But the best proof that N. wanted not an educated people, but only active and expert tools and agents, was the indifference that he manifested to primary and elementary education. In a population of 32,000,000, the number of pupils under ten years is given by Fourcroy at only 75,000! The internal government was the acme of despotic centralisation. N. appointed all prefects of departments, and all mayors of cities, so that not a vestige of provincial or municipal freedom remained. He ruled France as he ruled the army of France, and was already an emperor in almost everything but the name.

Peace between France and England did not last long. N.'s policy in Italy irritated the British government, and as remonstrances were ineffectual, war was declared against France, 18th May 1803. The English fleet scoured the seas, paralysing the commerce of France; while N. threatened to invade England, and assembled a large army at Boulogne. So utterly did he misconceive the character and condition of Englishmen, that he felt sure (by his own statement) he should be welcomed as a liberator by the people! While these warlike preparations were going on, occurred the dangerous conspiracy of the Chouan chief, George Cadoudal (q. v.), Pichegru (q. v.), Moreau (q. v.), and others. Its discovery (February 1804) alarmed N. excessively, and led to what has been considered one of the blackest deeds in his career—the murder of the Duke d'Enghien (q. v.) on the 20th of March following. He now appears to have felt it necessary to assume the title of emperor. France, he alleged, wanted an empire as a symbol of permanent security. An appeal was made to the nation. Upwards of 8,000,000 votes were given in favor of the proposed change in the form of government; only 3000 or 4000 against it. But where there is no municipal freedom, one does not know what value to put on votes. On the 18th May, N. assumed the title of Emperor at St Cloud, and was crowned by, or rather in the presence of, the pope (for N. rudely crowned himself), on the 2d December. In the following summer (May 26) he was also crowned king of Italy, in the great cathedral of Milan; and Eugène Beauharnais, his step-son, was appointed to the office of Viceroy.

This policy of aggrandisement, which set at naught the conditions of the treaty of Lunéville, alarmed the other nations of Europe, especially Austria, who saw her Italian possessions seriously threatened. In 1805, a coalition was formed between England, Russia, Austria, and Sweden, mainly through the persevering policy of the first of these countries; and war again broke out in the month of September. N. acted with amazing celerity. Concentrating his widely-scattered forces at Mainz, he marched at once across Bavaria, compelled General Mack to capitulate at Ulm with 20,000 men (11th October); and on the 18th of November entered the capital of Austria. France was electrified; the rest of Europe was thunder-struck. But a more glorious triumph was yet to come. The Russian army was already in Moravia, under the immediate command of the Emperor Alexander I., and was there being joined by the scattered Austrian troops. N. did not lose a moment. Hurrying north, he gave battle to the allies at Austerlitz, on the 2d of December. The contest was tremendous; but the victory was complete. N.'s opponents were utterly crushed; and next day the Austrian emperor sought an interview, and sued for peace. A treaty was signed at Presburg on the 26th December, by which Austria ceded to France all her Italian and Adriatic provinces; other changes effected by it were, the dissolution of the old German empire, and the formation of the *Confederation of the Rhine* (q. v.).

In February 1806 a French army conquered Naples, and the crown was conferred by N. on his brother Joseph; in the following June, another brother, Louis, was made king of Holland. Prussia now, when it was too late, assumed a hostile attitude. She had bungled off partly through fear and partly through selfishness, from the

great anti-French coalition of the previous year, and now, when circumstances were almost hopelessly adverse, she madly rushed against her colossal enemy. Austria, with more magnanimity than prudence, lent her help, but the star of N. was still in the ascendant. The battle of Jena (October 14) absolutely annihilated the power of Prussia; five days later N. entered Berlin, whence he issued (November 21) his celebrated "Decrees" against British commerce, hoping to ruin her by shutting out her ships from every harbor in Europe. His expectations, it need hardly be said, were disappointed. His policy well-nigh ruined the commerce of his own and other countries, but it only increased the prosperity of England. Her fleets and cruisers swept the seas; nothing could be got from the colonies save through her, and the merchants of the continent were obliged—in order to supply their customers as before—to let her carry on a vast contraband traffic. See **ORDERS IN COUNCIL**.

After the capture of Berlin, N. proceeded northwards to encounter the Russians, who were advancing to the help of Prussia. On his way, he summoned Poland to rise, but only with partial success. At Pultusk (December 28, 1806), and at Eylau (February 8, 1807), the French were beaten and driven back on the line of the Vistula; but after some months, he received heavy reinforcements, and on the 13th of June fought and won the great battle of Friedland, which led to the treaty of Tilsit, signed on the 7th of July. By a secret article of this treaty, Russia promised to close her ports to British vessels. It is important to observe here, that, as the military triumphs of N. increased, the civil and political liberties of his subjects diminished. Consequent on the treaty of Tilsit, a decree of the imperial senate abolished the tribunate—the only political body in France that preserved the semblance of national self-government. In August, N. created his brother Jerome sovereign of Westphalia—having patched up a kingdom for him in his usual unscrupulous way—and soon after, entered on a war with Portugal—the beginning of the great Peninsular War. The occasion of the war was the refusal of the Prince-regent of Portugal to carry out the Berlin decree in regard to British shipping. In March 1808, occurred that extraordinary instance of trepanning at Bayonne, by which the whole royal family of Spain fell into the hands of N.; and in the following July, his "dearly beloved brother" Joseph was ordered to exchange the throne of Naples for the "crowns of Spain and the Indies." His successor was the "handsome swordsmen" (*beau sabreur*), Joachim Murat. Spain rose in insurrection, and an English force, under Sir John Moore, was despatched to its assistance. N. invaded the country about the close of October, defeated the Spanish forces, and captured Madrid (4th December). But his presence was urgently needed elsewhere, and he was forced to let Soult and other generals conduct the war in the peninsula. Austria, again irritated and alarmed at his aggressive policy, especially in Italy (where he had seized Tuscany and the States of the Church), once more prepared for war, which broke out in the spring of 1809. Her army of Germany, commanded by the Archduke Charles, was in splendid condition; but still fortune was adverse. N. hurried into Bavaria, routed the Archduke at Eckmühl (22d April), compelled him to retreat into Bohemia; and on the 12th of May, entered Vienna for the second time. But the struggle was not over. The Archduke rallied his scattered forces, worsted N. in the terrible conflicts of Aspern and Essling (21st and 22d May), and drove him to take refuge for a time on an island of the Danube. The battle of Wagram (6th July), however, once more prostrated, or at least intimidated Austria; and on the 14th of October, she signed the peace of Schönbrunn.

N. appears to have now come to the conclusion, that he could only put a stop to the hostile machinations of the old legitimate dynasties by intermarrying with some one of them. Besides, his wife Josephine had no children—and he was ambitious of perpetuating his power in his family. With that callousness to everything except his own interests, which is a prominent feature of his character, he immediately proceeded to divorce her. The act of divorce was solemnly registered on the 16th December. Less than three months afterwards, he married Maria Louisa, Archduchess of Austria. He was now at the zenith of his power, and so, according to the old Greek belief, Nemesis was on his track. What caused his ruin was really that outrage on civilisation—the Berlin Decrees. Russia found it impossible to carry it out, without permanent injury to her great landowners; Sweden and other countries were in a similar predicament. This led to evasions of the decree, and these, again, involved Russia particularly in further complications, until finally, in May

1812, N. declared war against her; and in spite of the advice of his most prudent counselors, resolved to invade the country. Every one knows the dreadful history of the Russian campaign. N., wringing contingents from all his allies—Germans, Austrians, Italians, Poles, and Swiss—concentrated between the Vistula and the Niemen an army of half a million of men. The vast horde crossed the latter river (24th and 26th June) in three divisions, captured Wilna (28th June), and ravaged Lithuania. The Russian generals retreated before the invading host, deliberately wasting the country, and carrying off the supplies, but avoiding as far as possible, all engagements—their design being to surround N. in the heart of the country, and by the help of famine and the rigors of a northern winter, to annihilate him in his hour of weakness. N. followed up the retreating foe with reckless resolution. He risked everything upon the chance of striking some overwhelming blow. The horrors of his march—in Lithuania alone, 100,000 dropped off (dead, sick, or captured by the swarms of Cossacks that hung upon his flanks)—are too familiar to require description. When he reached Smolensk (16th August), the Russians had just left it—on fire! Three weeks or so later, he made up on the enemy at Borodino, where an obstinate and bloody battle was fought (7th September). The French remained in possession of the field, but of nothing else. A week after, N. entered Moscow, hoping to find rest for a time in the ancient metropolis of the country. But the city was deserted by its inhabitants; and on the 16th a fire broke out, which raged till the 19th, and left Moscow a heap of ruins. After five weeks' stay, N. was obliged to commence his retreat (19th October). His army was reduced to 120,000 men. The winter set in much earlier than usual, and he had to return through the very districts which had been wasted on his advance. When he left Smolensk (14th November), he had only 40,000 fighting-men; when he crossed the Beresina (26th and 27th November), he had not more than 25,000. With the excuse—which was in itself no doubt true—that his presence was urgently needed in France, he now abandoned the miserable remains of his army; and, on the 5th of December, leaving Murat in command, set out in a sledge for Paris, where he arrived on the 18th of the same month. He instantly set about a fresh conscription; and in the spring of 1813 marched into Germany at the head of 350,000 men; but the Russian campaign had broken the spell of terror which his name had till then exercised. The spirit of all Europe was thoroughly roused. A conviction was—somewhat unconsciously—seizing every mind (at the close of the campaign of 1814, even France shared it), that the world had had “enough of Bonaparte” (*assez de Bonaparte*). Prussia, in particular, was burning to wipe out the disgrace of Jena, and all the bitter humiliations to which she had been subsequently subjected. The victories of the British in Spain, the fame of which was spreading all over the continent, also proved to her that French soldiers could be beaten, not once or twice only, but through whole campaigns. An alliance was formed between the king of Prussia and the Emperor Alexander. At first, Austria remained neutral, but afterwards she joined the coalition. N.'s military genius, it has been often remarked, never shewed to greater advantage than in this and the next campaign, which cost him his crown and his liberty. He was for some months successful in winning battles—at Lützen (2d May), Bautzen (21st May), and Dresden (24th, 25th, and 27th August); but the invincible temper of the allies who knew that he was playing his last card, made these victories almost fruitless. They were convinced that one grand defeat would neutralise all his triumphs. This was inflicted, after several minor defeats, at Leipzig—the great *Battle of Nations*, as it has been called (16th, 18th, and 19th October). The result justified their expectations—N. was hopelessly ruined! He commenced his retreat towards France, followed by the allies. When he recrossed the Rhine, he had only 70,000 or 80,000 men left out of his 350,000. All the French garrisons in the Prussian towns were compelled to surrender. N. appeared at Paris 9th November; and though great discontent prevailed in the country, and a spirit of opposition shewed itself even in the legislative body, the senate decreed, at his bidding, another conscription of 300,000 men, with which N. began, in January 1814, to attempt to drive the allies out of France. The skill and energy which he displayed were extraordinary; but they only marked the intensity of his despair. On the 30th of March, the allied forces captured, after a severe engagement, the fortifications of Paris; next day, the Emperor Alexander and the king of

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Prussia entered the city *amid the shouts of the populace*; on the 4th of April, N. abdicated at Fontainebleau. He was allowed to retain the title of emperor, with the sovereignty of the island of Elba, and an income of 6,000,000 francs, to be paid by the French government. A British ship conveyed him to Elba, where he arrived on the 4th of May.

After a lapse of ten months, most of which was spent in intrigues, N. made his escape from the island, landed near Frejus on the 1st of March, 1815, and appealed again to France. The army went over to him in a body, and several of his marshals, but the majority remained faithful to Louis XVIII. On the 20th of March, he reached Paris, reassumed the supreme power, promised a liberal constitution, and prepared once more to try the fortune of battle with the allies. At the head of 125,000 men, he marched (15th June) towards Charleroi, on the Flemish frontier, where the English and Prussian forces were assembling. The Duke of Wellington, who, the year before, had completed the deliverance of Spain, was appointed by the Congress of Vienna commander-in-chief of the armies of the Netherlands. The campaign lasted only a few days. On the 16th, N. defeated the Prussians, under Marshal Blücher, at Ligny, which compelled Wellington to fall back on Waterloo, where, on the 18th, was fought the most memorable and decisive battle of modern times. It resulted in the utter and irrevocable ruin of Napoleon. The despot, who knew what awaited him—for France had not recalled him from Elba; he came at the desire of a faction, whose interests were identical with his—returned to Paris. The House of Representatives fiercely insisted on his abdication. He did so (22d June) in favor of his son, Napoleon II.; they further demanded that he should leave the country for ever, and he retired to Rochefort, with the design of embarking for the United States. On the 7th July, the allies again entered Paris, and refused to acknowledge the acts of the French provisional government. N., who saw that he could not escape either by sea or land, voluntarily surrendered (15th July) to Captain Maitland of the *Bellerophon*, claiming the protection of British laws! It was, however, resolved by the British government to confine him for life on the islet of St Helena, a lonely rock in the Southern Atlantic, 1000 miles from the coast of Africa. He was conveyed thither by Admiral Cockburn, and landed at St Helena, 16th October, 1815. The remainder of his life was politically insignificant. His chronic quarrels with his governor—or jailer, as the French prefer it—Sir Hudson Lowe; his conversations with friends and visitors about his past career; his deliberate attempts to falsify history in his writings, are familiar to every one. After more than a year of bad health, he expired, 5th May, 1821. He was buried with military honors. In 1840, his remains were removed to France, and deposited in the *Hôtel des Invalides*.

NAPOLEON II., son of Napoléon Bonaparte. See REICHSTADT, DUKE OF.

NAPOLEON III., nephew of Napoléon Bonaparte. See LOUIS NAPOLEON.

NAPOLEON, or in full, Napoléon Joseph Charles Paul Bonaparte, is the son of Jerome, King of Westphalia, and was born at Trieste, in 1822. When the insurrection broke out in the Romagna in 1831, he was staying in Rome with his grandmother, Madame Letitia Bonaparte, but was forced to leave the city for Florence on account of his consuls (see LOUIS NAPOLEON) being implicated in the revolutionary disturbances. He was educated at a boarding-school in Geneva, and at the Military School of Ludwigsburg, in Würtemberg, completing his studies in 1840, after which he travelled for five years in Germany, England, and Spain. In 1845, he obtained permission to visit Paris under the name of the Comte de Montfort; but his relations with the democratic party, and his advanced political opinions, rendered him suspected by the government, who ordered him to quit the country. He, however, again made his appearance on the eve of the revolution of February 1848. After the fall of Louis-Philippe, he offered his services to the provisional government, and was elected by the *Correlans* a member of the Constituent Assembly, where he voted with the moderate republicans. He held for a short time, in 1849, the office of minister-plenipotentiary at Madrid. After the *coup d'état*, he withdrew into private life; but on the restoration of the Empire he reappeared to share in the honors that now fell thickly on his family. By a decree of the senate, 23d December 1853, he was pronounced a French prince, with the right to a place in the Senate and the Council of State; at the same time, he received the insignia of the Grand Cross of the Legion of Honor, and

—though he had not served—the rank of General of Division. In the Crimean war, he commanded a division of infantry-reserves at the battles of Alma and Inkermann, but soon after returned to France, on the plea of ill-health. N. was President of the Imperial Commission of the Paris Exhibition in 1865. In 1868, he was appointed head of the ministry for Algiers and the colonies, but held the office only for a short time. During the same year he married the Princess Clotilde, daughter of Victor Emmanuel, and in the Italian war of 1869, commanded the French army of reserve in the south of Italy, but was not engaged in actual hostility. In 1861, he made a speech in the senate, reflecting on the Orleans family, for which he was challenged by the Duc d'Aumale. The challenge was not accepted, much to the disgust of the French army. N. was President of the French Commission at the London Exhibition of 1862. In 1865, he was appointed president of the commissions for the Paris Exhibition of 1867, but resigned this post and the vice-presidency of the privy council owing to a reprimand from the emperor about a speech. Afterwards, however, he was intrusted with many delicate missions, and urged the emperor to a liberal policy. He had no command in the late war. In 1874, he was returned to the French Assembly for Corsica; but in the election of 1877 was rejected.

**NAPOLEON-VEKDÉE**, Bourbon-Vendée, or La Roche Sur Yon, a town of France, the capital of the dep. of Vendée, pleasantly situated on a hill on the right bank of the Yeu, 37 miles south from Nantes. The town has no manufactures, and little trade, but derives its importance chiefly from its being the seat of departmental administration. The town contained only 800 inhabitants when Napoleon I. selected it for the capital of the department, granted great sums for its improvement, and called it *Napoleon-Vendée*, changed to *Bourbon-Vendée* at the restoration of the Bourbons, the former name coming again into use under Napoleon III. It is now known as *La Roche sur Yon*. Pop. (1872) 7110.

**NARAKA** is the hell of the Hindus. Manu (q. v.) enumerates twenty-one hells or divisions of N., and gives a general description of the tortures which await the impious there. The Purân's, however, are more systematic. The Vishn'u-Purân'a, for instance, not only names twenty-eight such hells, but distinctly assigns each of them to a particular class of sinners. Thus, a man who bears false witness is condemned to the hell *Raurava* (i. e., Fearful); the murderer of a Brâhman, stealer of gold, or drinker of wine, goes to the hell *Sâkara* (i. e., Swine), &c. Besides these twenty-eight which the Purân'a knows by name, we are told of "hundreds and thousands of others in which sinners pay the penalty of their crimes."

**NARBONNE**, a town in the south of France, in the department of Aude, 55 miles south-west of Montpellier, on a branch (La Robine) of the Canal du Midi. It is the *Narbo Martius* of the Romans; but there is reason to believe that it was well known to the Greeks 500 years before the Christian era. It was colonised by the Romans 115 B.C., and probably got the designation *Martius* from Q. Marcius Rex, one of the consuls at the time. Situated only about 8 miles from the sea, on the direct road into Spain and into the basin of the Garonne, N. was in early times a place of great commercial prosperity. It was the second settlement founded in South Gallia by the Romans, and was considered by them an important acquisition, both for its strength and as the key to the road into Spain. Under Tiberius, it flourished greatly; the arts and sciences being cultivated with success, and its schools rivaling for a long time those of Rome. About 309 A.D., it became the capital of Gallia Narbonensis, and contained among other buildings a capitol, theatre, forum, aqueducts, triumphal arches, &c. It was taken in 719 by the Saracens, who planted here a Moslem colony, and destroyed the churches. In 859, it fell to the arms of the Northmen. During the 11th and 12th centuries, it was a flourishing manufacturing city, but subsequently it fell into comparative decay, and is now entirely destitute of any monument of its former splendor. A considerable number of architectural fragments—as capitals, marble slabs with inscriptions, friezes, &c.—have been found, and have been grouped into a collection of antiquities.

The present very dirty town contains one imposing building, the Cathedral of St Just, founded in 1271, but still unfinished. The honey of N. is the best in France, both for color and flavor. Manufactures are carried on to some extent. Pop. (1876) 12,326.

**NARCISSUS**, according to a Greek fable, was the son of the river god Cephalus and of the nymph Liriope or Liricessa of Thespise, in Boeotia. He was a youth of extraordinary beauty, of which he was excessively vain; and for this he was punished by Nemesis, by being made to fall in love with himself on seeing the reflection of his own face in a fountain. He died of this love-sickness; and on the place where he died, sprung up the flower which bears his name. The story of N., finely narrated by Ovid, is of comparatively late origin.

**NARCISSUS**, a genus of plants of the natural order *Amaryllidaceæ*, having a perianth of six equal petal-like segments, and a bell-shaped corona of various magnitude. The species are natives of the south of Europe, the north of Africa, and the temperate parts of Asia. The Common Daffodil (q. v.) is the only one which can be regarded as truly a native of Britain. Many are cultivated in gardens, for the sake of their beautiful and often fragrant flowers, which in general appear early in the season. Some of them are known by the names of Daffodil (q. v.) and Jonquil (q. v.). The name N. is popularly restricted to those which have flat—not rush-like—leaves, and a short not bell-shaped corona. Of these, one of the best known is the Poet's N. (*N. poeticus*), with generally one-flowered scape, the flower white and fragrant, the corona with a deeply-colored border; others, with one or two flowers on the scape, are in common cultivation.—The **POLYANTHUS NARCISSUS** (*N. tazetta*) has a number of flowers on the scape. It grows wild in stony places near the Mediterranean and eastwards to China. Many varieties of it are in cultivation. It is not only grown in gardens and green-houses, but in water-glasses, like the hyacinth. It is very common in gardens in India, where it is highly esteemed as a flower. The narcissi in general are propagated either by seed, or by offset bulbs. They succeed best in a rich light soil.

**NARCO'TICS** (Gr. *narkê*, stupor) are remedies which, in moderate doses, lessen the action of the nervous system. Their full operation is sleep or coma. Opium is the type: from which most descriptions of this class of medicines have been drawn; but although most narcotics more or less resemble opium in their action, almost every one presents some peculiarity in the way in which it affects the system. These medicines are primarily stimulating, especially when given in small or moderate doses; but this stage of their action is comparatively short; and when the dose is large, the excitement is scarcely perceptible. Their power of inducing sleep has procured for them the names of Hypnotics and Soporifics; while many of them are termed Anodynes, from their possessing the property of alleviating pain. Next to opium, Henbane, Indian Hemp, and Aconite may be regarded as the most important narcotics. It has been already mentioned that there are differences in the mode of operation of the different members of this class. "Some dilate, while others contract the pupil; some appear to concentrate their sedative action more particularly upon the functions of the encephalon, others upon the contractile power of the alimentary and bronchial tubes, while a strict distinction is to be drawn between those which occasion constipation and those which do not; all these things being of great practical importance. Ballard and Garrod's "Elements of Materia Medica," p. 18.

Narcotics are usually administered either with the view of inducing sleep or of alleviating pain or spasm. As, however, their action is much modified by a variety of circumstances—such as age, idiosyncrasy, and prolonged use—they should be administered with extreme caution; and as a general rule, only under competent advice. The various quick medicines for children which are known as *Carmenatives*; *Soothing Syrups*, &c., contain some form of opium, and are a fertile cause of the great mortality that occurs in early life, especially among the poorer classes.

It is almost unnecessary to add, that all the narcotics when taken in excess are poisonous.

**NARCO'TINE** ( $C_{16}H_{25}NO_4 + 2Aq$ ) is one of the organic bases or alkaloids occurring in opium, in which it usually exists in the proportion of 6 or 8 per cent. It is nearly insoluble in water, but dissolves readily in alcohol, ether, and chloroform. Its ethereal solution, when submitted to spontaneous evaporation, yields it crystallised in colorless acicular groups or in rhombic prisms. A mixture of concentrated sulphuric and nitric acids produces a blood-red color with narcotine and its compounds. Narcotine possesses very slight alkaline properties; its salts do not readily crystallise, and are even more bitter than those of morphia, although the substance

itself is almost tasteless. When first discovered (in 1803), it was supposed to be the stimulant principle of opium; but in reality it possesses very little activity. It has been prescribed in gradually increased doses up to a scruple, without the least injury. Its sulphate has been used in India as a substitute for quinine; and nearly 200 cases of intermittent and remittent fevers, treated by it with success, have been published by Dr O'Shaughnessy.

**NARD AND NARDO-STACHYS.** See **SPIKENARD**.

**NARDO** (anc. *Neretum*), a town of South Italy, in the province of Lecce, 8 miles north-north-east from Gallipoli. N. has manufactures of cotton goods and snuff, from cotton and tobacco grown in the neighborhood. The surrounding country abounds in olive plantations. Pop. about 8500.

**NARDOO** (*Marsilea quadrifida*), a plant of the acotyledonous natural order *Marsileaceae* (q. v.), the only plant of that order which is used in any way by man. It has but recently become known to botanists. It is found in Australia, and affords important supplies of food to the natives of some regions; it has also been of great use to some recent exploring-parties. It grows in places occasionally covered with water; vegetating whilst moisture abounds, and then exhibiting abundance of green clover-like foliage, the leaves consisting of three leaflets at the top of a stalk some inches in length. When the water dries up, the remains of the plants are often covered with dried mud. It is then that the spore-cases are gathered for food. They are oval, flattened, about an eighth of an inch in length, hard and horny, and requiring considerable force to pound them when dry, but becoming soft and mucilaginous when moistened. The spore-cases, pounded with their contents, are made into cakes like flour.

**NARDUS**, a genus of grasses, having a simple spike, spikelets all on one side, no glumes; each spikelet consisting of one floret, which has two paleas, the outer ending in a long point. *N. stricta* is one of the most common of British grasses, growing in dry elevated situations, and very characteristic of them. It grows in tufts, and is often called **MAT-GRASS**. It is perennial, purplish, short, rigid, and very worthless, as almost no animal but the goat will eat it.

**NAREW**, a river of West Russia, an affluent of the Bug, rises in the government of Grodno, and flows west-south-west to the main stream, which it joins at Strock, after a course of 294 miles. The waters of the N. are about as great in volume as those of the Bug. It is navigable to Tykoczyn, 150 miles from its mouth.

**NARO**, a town of Sicily, in the province of Girgenti, and 14 miles east of the town of that name. It has 10,253 inhabitants, who trade in oil, wine, and sulphur. Numerous tombs, medals, and other antiquities have been found here.

**NARSES**, a celebrated statesman and general, and almost the last stay of the old Roman empire in Italy. was born towards the last quarter of the 5th century. The place of his birth is uncertain. His parentage was obscure, and he was probably sold as a slave in childhood, having, according to the barbarous usage of the period, been previously emasculated. From some menial office in the imperial household at Constantinople, he rose by successive steps to the post of *cubicularius*, or private chamberlain of the Emperor Justinian, and ultimately to that of keeper of the privy purse. In the difficult art of courtiership, N. long maintained a pre-eminence. More remarkable, however, considering his condition, was the distinction which he attained in military affairs. In 528 he was sent to Italy in command of a body of troops, professing to act in concert with Belisarius (q. v.), but in reality, it is conjectured, with a secret commission to observe and to control that general. After some successes, N. having disputed with Belisarius, assumed an independent authority; but his separate command was unfortunate, and he was recalled to Constantinople in 529. After some years, however, Belisarius was recalled, and N. was appointed to the chief command in Italy. His conduct of that expedition extorted the admiration even of his enemies. Not having the command of a sufficient number of transports, he marched his army along the whole circuit of the shore of the Adriatic, and while the enemy's fleet were still in possession of the sea, was enabled to encounter them in the plain of Santagino, near Targia, where, after a desperate engagement, the Goths were totally defeated, and their king, Totila, slain. N. took possession of Rome, and after a



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Nasallia

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series of successes both in Southern and Northern Italy, completely extinguished the Gothic power in that peninsula. Justinian appointed N. exarch of Italy in 553. He fixed his court at Ravenna, and continued, till the death of Justinian, to administer the affairs of Italy with a vigor and ability which did much to stay the progress of that decay which had long infected all its social, political, and military institutions. The only blot on the character of his administration is the avarice with which he is charged by his contemporaries. His exactions pressed heavily on the exhausted resources of the population; though their severity may be in some degree palliated by the splendor and utility of the public works on which he partly expended the public resources. On the death of Justinian, his ascendancy came to an end. The Romans, on the accession of Justin, complained to him of the exactions of N., and that emperor deprived him, in 565, of his office; a proceeding to which a special indignity was imparted by an insulting message from the empress, that it was time for him to "leave arms to men, and to spin wool among the women of the palace." To this bitter taunt (according to Paulus Diaconus, "*De Gest. Long.*" ii. 6), N. replied that he would "spin for her a thread which she would find it hard to unravel;" and he is accused of secretly luring with Alboin, king of the Lombards, to incite a new invasion of Italy, at the same time submissively offering his services to the emperor for the purpose of repelling the invasion. This account, however, seems uncertain, and perhaps improbable; and as N. died at Rome in 568, just on the eve of the Lombard invasion, no light is thrown upon this story by the actual events of the war. His age at the time of his death is a subject of much curious controversy. According to the popular account, it was no less than 95 years; but this is doubted by most of the historians.

NA'RTHEX, a part of the early Christian churches separate from the rest by a railing or screen, and to which the catechumens and penitents were admitted.

NA'RNA, a Russian town in the gov., and 95 m. w. a. w. of St Petersburg, is situated on the Narova, 10 m. from its mouth in the Gulf of Finland. It was founded in 1233 by Waldemar II., king of Denmark, and came into the possession of Russia in 1704. The navigation of the Narova is impeded by a waterfall near N., 14 feet high. In 1873, 163 ships, of 18,175 lasts (1 last = 1 11-14 ton), entered the port; the exports, chiefly flax and timber, were £180,693; the imports, £402,340. At the waterfall above the town there are sawmills, and an extensive cotton-mill, which employs 1700 workmen. Though belonging to the government of St Petersburg, N. is ruled by the laws of the Baltic provinces. Here, in November 1700, Charles XII., with 6000 men, defeated a Russian army of 60,000 men, under Peter the Great and the Duke of Croy. Pop. (1867) 6175.

NARVAEZ, Don Ramon Maria, Duke of Valencia, a Spanish general and statesman, was born at Loja, in Andalusia, 4th August 1805, and when very young, served in the war of Liberation against the French. He was an officer in 1820, when constitutional government was re-established in Spain, and in 1822, when a reactionary party of the royal guard took up arms to destroy the work of the revolution, N. ranged himself on the side of the liberals, and contributed by his courage to the repression of the mutiny. Shortly after, under the command of Mina, he made the campaign of Catalonia against the guerrillas, who were assisted by the monks. The invasion of Spain by a French army in 1823 forced him to retire from active life. He withdrew to Loja, and lived there in obscurity until the death of Ferdinand VII. in 1832. In 1834, as captain of chasseurs, he maintained a hot struggle against the Carlists of the Basque provinces, and signalised himself in various engagements. In 1836, he commanded a division under the orders of Espartero, and in November of that year, completely routed the Carlist leader, Gomez, near Arcos. This was a decisive moment in his career. He now became immensely popular, aspired to the highest offices of the state, and was regarded as the rival of Espartero. In 1838, by acts of terrible severity, he cleared the district of La Mancha of brigands, and was appointed in 1840 captain-general of Old Castile, and general-in-chief of the army of reserve. When Espartero gave General Alaxa a place in the ministry, N. resigned his command. He took part in the insurrection against Espartero that broke out at Seville in 1840, but that having failed, he was compelled to flee to France, where he was shortly after joined by Queen Christina (see MARIA CHRISTINA), and commenced those plots against the government of Espartero which, in 1843, effected its

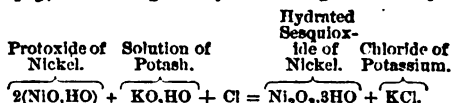
overthrow. In 1844, he was appointed president of council, and created Duke of Valencia. His ministry was thoroughly reactionary. He recalled Maria Christina, and revised the liberal constitution of 1837. The progressista party was dissatisfied, and petty insurrections broke out, which the rigorous soldier-statesman repressed with an iron hand. But his dictatorial manners finally alienated even his personal friends, and his ministry was overthrown (10th February 1846). After a brief exile as special ambassador at the French court, he returned to power in 1847, but soon afterwards quarrelled with Queen Christina, and found it necessary again to retire from office in 1851. In 1856, on the overthrow of O'Donnell's ministry, he again became president of council, and immediately commenced to strengthen the royal authority, and to restrict the liberty of the press. The intrigues of the court compelled his resignation in 1857. He returned to power in 1864, and (1865) was succeeded by O'Donnell, with whom he suppressed, in 1866, a military revolt in Madrid. He replaced O'Donnell in the same year, and, despite the efforts of O'Donnell and Prim, retained power till his death in 1868.

**NA'RWHAAL** (*Monodon or Narwhalus*), a genus of *Cetacea*, of the family *Delphinida*, resembling *Beluga* (q. v.) in form and in the want of a dorsal fin, but remarkably characterised by having no teeth at all, except two in the upper jaw, supposed to be canines, which sometimes remain quite rudimentary, even in the mature animal, as they are in the young, and are sometimes developed into great spirally twisted straight tusks, passing through the upper lip, and projecting like horns in front. Only one species is ascertained, *M. monoceros* or *N. vulgaris*; the other species which have been described by naturalists having been founded on exaggerations and untrustworthy observations. It inhabits the Arctic seas, and is very rarely found so far south as the Shetland Isles, although an accidental wanderer has reached the coast of England. Narwhals are often seen in great numbers among the ice-fields, and in the creeks and bays of the most northern coasts. They commonly associate in small herds. The tusks are much more frequently developed in the male than in the female, but in the female also they sometimes attain a large size. It is but rarely that both tusks are largely developed, although they sometimes are so, and then diverge a little; one of them generally continues rudimentary, or attains a length only of a few inches, whilst the other becomes a great horn, projecting straight in front, from which the animal has received the name of SEA UNICORN. A mature N. is generally about fifteen or sixteen feet in length, without reckoning the tusk, which is from 6 to 10 feet long. The body is less thick than that of the Beluga; the head is small, the forehead rises abruptly, the muzzle is very obtuse, the upper jaw projects a little; the first half of the body is nearly cylindrical, the remainder to the tail fin is conical. The tusk is hollow nearly to the point. Its use is rather conjectured than known. It is probably a weapon of defence, but Scoresby has suggested that it may be also used for breaking thin ice in order to obtain opportunity for respiration; and for killing fish, as he found remains of skates and other flat-fish in the stomach of a N., which it is not easy to imagine how a toothless animal, with rather small mouth and lips, could capture and swallow, unless the formidable tusk were first employed. Cephalopodous molluscs, however, are believed to constitute a principal part of the food of narwhals. The N. is a very active animal, swimming with great rapidity, lively, and playful. A group of narwhals playing together, projecting their great horns from the sea, and crossing them in their sport, is a very interesting sight. The N. is pursued by the Greenlanders and other inhabitants of the north, for the sake of its blubber, with which its whole body is invested to the thickness of about three inches, amounting to nearly half a ton in weight, and yielding a large proportion of excellent oil. The tusks are also valuable, being of an extremely compact white substance—denser, harder, and whiter than ivory—which is used as a substitute for ivory. The kings of Denmark have long possessed a magnificent throne of this material, which is preserved in the Castle of Rosenborg. The flesh of the N. is used by the Greenlanders as food. Great medicinal virtues were formerly ascribed to the tusks; but were merely imaginary.

**NASA'LIS**, or Proboscis Monkey (*Nasalis larvatus*), a monkey allied to the *Doucas* or *Semnopithecus*, but distinguished from all other monkeys by an extreme elongation of nose, that organ being nearly four inches in length in the mature animal. In the

young, the nose is comparatively undeveloped. The nostrils are placed quite at the extremity of the nose, and are separated merely by a thin cartilage. Of what use the magnitude of its nose is to the animal, is unknown. The N. inhabits Borneo and neighboring islands. It is gregarious. It is an animal of about three feet in height, if placed erect, a position it does not often assume. It can leap fifteen feet or more. Its fur is thick, not long, nor woolly; chestnut red, and in some parts golden yellow.

**NA'SCENT STATE**, in Chemistry. When an element or compound is liberated from some chemical combination in which it had previously existed, the element or compound so liberated is at the moment when it escapes said to be in a nascent state; and it is then often capable of exerting far more powerful combining action with other bodies than it can exhibit when brought in contact with them *after* it has been liberated. Arsenic and hydrogen will not directly combine if brought in contact with one another under ordinary circumstances, but the application of Marsh's test (see **ARSENIC**) depends upon the direct union of the nascent hydrogen (liberated by the decomposition of the water) with the arsenic, giving rise to arseniuretted hydrogen gas. Again, if hydrated protoxide of nickel ( $\text{NiO}, \text{HO}$ ) be suspended in a solution of caustic potash ( $\text{KO}, \text{HO}$ ), it will undergo no change if a current of oxygen gas be passed through the solution; but if a current of chlorine be substituted for the oxygen, the whole of the metallic protoxide will be converted into the brown sesquioxide ( $\text{Ni}_2\text{O}_3$ ), the resulting decomposition being shewn in equation:



This change arises from the action of the chlorine upon the potash, during which chloride of potassium (KCl) is formed, while the nascent oxygen which is liberated from the potash combines with the oxide of nickel. Again, cyanogen ( $\text{C}_2\text{N}$ ) and chlorine do not enter directly into combination, but if cyanogen at the instant that it is liberated from one of its compounds (as, for example, cyanide of mercury) comes in contact with chlorine, the two combine; and many other examples of similar action might be adduced.

**NA'SEBY**, a parish and village of England, in the county of Northampton, 13 miles north of the town of that name. Pop. (1871) 693. The battle of N., between Charles I. and the parliamentary army under Fairfax and Cromwell, took place here, June 14, 1645. It resulted in the total defeat of the royalists, the king being compelled to flee, after losing his cannon and baggage, and nearly 6000 of his army as prisoners.

**NASH**, Richard, better known by the name of *Beau Nash*, a fashionable character of the last century, who attained to a very remarkable notoriety, was the son of a Welsh gentleman, and was born at Swansea, in Glamorganshire, October 13, 1674. After studying at Oxford, he held for some time a commission in the army, and subsequently took rooms in the Temple, but the dissipations of society had more attractions for him than the pursuits of law. He became a dinner-out, a frequenter of good society, and contrived to support himself by gambling. But the grand turning-point in his fortunes was his visit, in 1704, to Bath—a then favorite haunt of elegant invalids, and the scene of the gayest intrigues. N. undertook the management of the public balls, which he conducted with a splendor and decency never before witnessed. In this way he came to acquire an imperial influence in the fashionable society of the place. It appears that he was also distinguished by a species of sentimental benevolence. He played hard and successfully; yet if he heard an individual sighing behind his chair: "Good Heavens! how happy would that money make me," N. would thrust his own winnings into his hands, with theatrical generosity, and exclaim: "Go, and be happy." His own equipage at this period of his career was sumptuous. He used, we are told, to travel to Tunbridge in a post-chariot and six grays, with outriders, footmen, French-horns, and every other appendage of expensive parade. He is praised for the great care which he took of the morals of the young ladies who attended the Bath balls, always putting them

on their guard against needy adventurers—like himself. In his old age, Benú N. sank into poverty, and often felt the want of that charity which he himself had never refused. He died at Bath, February 3, 1761, at the age of 87.

NASH, John, an architect, was born in London in 1752. He underwent the usual course of training for his profession, but soon entered into some building speculations which enabled him to buy a small property in Caermarthen. Here in fresh speculations he lost much money; therefore, in 1792, returned to London and architecture, in which he speedily rose to eminence. On the strength of having obtained a patent in 1797 for improvements in the construction of the arches and piers of bridges, he was in the habit of claiming a great part of the credit of introducing the use of cast-iron girders. A large part of his time was occupied in designing and constructing mansion-houses for the nobility and gentry in England and Ireland, but he is chiefly celebrated in connection with the great street improvements in London. From February 1815, when he was appointed "architect, valuer, and agent to the Board of Woods and Forests," down till near the end of his professional career, he was busily engaged in the planning of routes, grouping of buildings, and fixing of sites. Regent Street, Haymarket Theatre, Langham Place Church, and the terraces in Regent's Park, are specimens of his designs. The Pavilion at Brighton was another of his works. He retired from his profession in 1834, and died May 13, 1835. N., notwithstanding his many defects, possessed great power of effective grouping, as is well shewn in his works. In the architecture of mansion-houses, the designing of "interiors" was his forte.

NA'SHUA, a manufacturing city of New Hampshire, U. S., at the junction of the Merrimac and Nashua Rivers. The falls of the latter afford water-power to six large manufacturing companies, which have extensive cotton-mills, machine-shops, &c. It has ten churches, 8 banks, 2 newspapers. Pop. (1870) 10,548; (1880) 13,397.

NA'SHVILLE, a city, port of entry, and capital of Tennessee, U. S., on the Cumberland River, 200 miles above the Ohio, and a little north of the centre of the state. The river is navigable by steam-boats of 1500 tons fifty miles above Nashville. Five railways connect it with a vast and fertile country. It is a handsome, well-built city, with a state-house, which cost a million of dollars; court-house, 3 universities, hospital, custom-house, theatre, penitentiary, free academy, Protestant and Catholic orphan asylums, 84 churches, with numerous daily, weekly, and monthly publications. It has a large commerce, flour, saw, and planing mills, a large cotton factory (with 400 looms and 13,840 spindles in 1875), manufactories of engines and machinery, &c. The value of the wholesale trade in 1873 was 51,261,570 dollars. Near the city are the State Lunatic Asylum, and the "Hermitage," once the residence of President Jackson. N. was occupied by the Federal troops in 1862, and here the Federal General Thomas gained a victory over General Hood. Pop. in 1880, 43,350.

NA'SSAU, formerly a German duchy, now Wiesbaden, a district of the Prussian province of Hesse-Nassau, in 49° 50'—50° 50' n. lat. and 7° 30'—8° 45' e. long., is bounded w. and s. by the Main and the Rhine, the Prussian-Rhenish provinces, and the grand-duchy of Hesse; e. by the Hesse and Frankfort territories; and n. by Westphalia. Area, 1802 square miles. Pop. (1875) 690,215. Wiesbaden possesses very great physical advantages. In its southern districts, nearly the whole of its area is occupied by the Taunus Mountains, whose highest point, the Great Feldberg, attains an elevation of about 2750 feet. This range includes within its boundaries the fertile valleys known as the Rheingau. The northern part of the district includes the barren highlands of the Westerwald, whose most considerable peak, the Salzburger Head, is nearly 2000 feet high. Besides the Rhine and the Main, which are the boundary-rivers, Wiesbaden is traversed from east to west by the Lahn, which becomes navigable at Weilburg, and is augmented by the confluence of numerous other streams, as the Well, Ems, Aar, Dill, and Elbe. The productiveness of the soil is proved by the excellent quality of the numerous vegetable products, which include corn, hemp, flax, tobacco, vegetables, and fruits, including grapes, which yield some of the most highly esteemed Rhenish wines. The hills are well wooded, and abound with game of various kinds, and the rivers yield an abundance of fish and crustaceans. In the more mountainous districts, iron, lead, copper, and some silver are obtained, together with good building-stone, marble, and coal; the chief mineral wealth is, however, derived from the numerous springs, which, directly and indirect-

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ly, bring the government a clear annual gain of more than 100,000 gulden. The most noted of these springs, of which there are more than 100, are Wiesbaden, Weilbach, Langen-Schwalbach, Schlangenbad, Ems, Selters, and Gellman, the majority of which were the property of the duke.

Wiesbaden, which is divided into 12 circles, has few towns of any commercial importance, but it boasts of many fashionable watering-places, which are annually crowded with visitors from every part of the world. Of these, the most considerable are Wiesbaden (q. v.), the capital of the district—pop. (1875) 43,674—Schwalbach, Schlangenbad, Fachingen, Selters, and Gellman. Höchst, an active little place on the Main, is the only manufacturing town of the duchy, but a brisk trade is carried on at many small ports on the Rhine, Main, and Lahn, from whence the mineral waters, wines, and other natural products of the country are exported. The exports are wine—including some of the choicest kinds, as Hochheimer, Johannisberger, Rüdesheimer, Markobrunner, Asmannshäuser—mineral waters, corn, iron, manganese, cattle, &c.; while the imports embrace colonial products, manufactured goods, salt, jewellery, &c.

N. had a representative form of government, based on the constitution of 1814; and the duke, who was also a Count-Palatine of the Rhine, Count of Sayn, Köttingen, Katzenellenbogen, and Dietz, &c., was assisted in the government by a council of state, presided over by a prime-minister. The legislative assembly consisted of an upper chamber, composed of 24 representatives, chosen for six years, and a second chamber, chosen annually. More than one-third of the population belonged to the Catholic Church, which was under the ecclesiastical jurisdiction of the bishop of Limburg, who was assisted by a board of commissioners, located at Eltville, on the Rhine; and excepting about 19,000 persons who belonged to the Jewish and other persuasions, the remainder of the people, including the then reigning house, professed the "evangelical" form of German Protestantism, and were comprehended in one episcopal see under the bishop of Wiesbaden. Ample provisions were made in the district for popular education, in furtherance of which there were upwards of 700 elementary schools, with about 1000 teachers, 10 normal schools, a gymnasium, various training, theological, polytechnic, military, and other educational institutions. In accordance with a treaty with Hanover, Göttingen constitutes the university for arts for Wiesbaden, which has also a Roman Catholic theological faculty in conjunction with Hesse-Cassel at the university of Marburg. Wiesbaden, which is the principal seat for all national institutions of literature, science, and benevolence, has a good public library, containing 80,000 volumes, a museum, &c.

N. occupied, in conjunction with Brunswick, the thirteenth place in the limited council of the diet, but it had two votes in the *plenium*, or full council. It furnished a contingent of 4279, with a reserve of 1833 men, to the army of the old confederation.

The receipts, according to the budget of 1866, were 4,461,410 florins derived from the crown domains and indirect taxes, and 317,935 florins from direct taxation, while the expenditure was estimated at 5,804,975 florins. The national debt at the close of 1864, represented a capital of 6,088,300 florins. The duke, who was in possession of very extensive domains, ranked as one of the richest princes of Germany.

In tracing the history of N. to its earliest origin, we find that the districts now known by that name were anciently occupied by the Alemanni, and on the subjugation of the latter people by the Franks, became incorporated first with the Frankish, and next with the German empire. Among the various chiefs who raised themselves to independent power in this portion of the Frankish territories, one of the most influential was Otto of Laurenburg, brother of King Conrad I., who became the founder of two distinct lines of princes. The heads of these lines were Walram and Otto, the sons of Count Henry I., who, in 1253, divided the land between them. Walram II., the elder, was the progenitor of the house of Laurenburg, which, towards the close of the 12th c., assumed its present name of N. from the name of its chief stronghold; while Otto, the younger, by his marriage with the heiress of Gelders, founded the line of Nassau-Gelders, whose last male representative died in 1423, but which still survives through a female branch, in the family now occupying the throne of the Netherlands. This junior branch of the house of Nassau, by

Inheritance from a collateral representative, acquired possession, in 1544, of the principality of Orange; and since that period, the representatives of the Otto line have been known as Princes of Orange (q. v.). The Walram line, which in 1292 gave an emperor to Germany, in the person of Adolf of N., was subdivided by the descendants of that prince into several branches, until, by the successive extinction of the other lines, the Nassau-Weilburg family, which at present reigns over the duchy, was left, in 1816, the sole heir and representative of the Walram dynasty in Germany. N. had been declared a duchy in 1806, and in 1817 the reigning Duke William granted a new constitution; but during the first sittings of the assembly, dissensions arose between the ducal government and the representatives, the former having attempted to establish the proposition that the ducal domains were the unconditional property of the royal house, and that all the expenses of the state would consequently have to be met by taxation.

This proved a fruitful source of dissension between the duke and his people, and the opposition and discontent to which it gave rise, were not finally allayed till 1834, when a more liberal ministry, under Count Walderdorff, succeeded the unpopular cabinet which had hitherto directed public affairs. Concessions were made by the ducal government, which met the requirements of the chambers, and a satisfactory compromise was effected in regard to the crown revenues. In 1836, N. joined the German *Zoll-Verrein*, and subsequently to that period, it has continued to advance in material prosperity. The reigning Duke Adolphus William, who succeeded his father, Duke William, in 1839, shewed the same conservative tendencies as his predecessor. The revolutionary crisis of 1848 found the people, who had been harassed by over-government and by a jealous dread of liberal sentiments, ripe for insurrection. The peasantry rose *en masse* in the rural districts, and revenged themselves for the severity of the game-laws, and other obnoxious restrictions, by perpetrating the most wanton destruction of game and wood in the forests belonging to the crown and nobility. These disorders were speedily put down by the aid of federal troops, but notwithstanding the concessions made by the government, the relations between the people and their ruler continued for many years to be unsatisfactory. For the events which led to the incorporation of Nassau with Prussia, see GERMANY.

NASSAU, the capital of New Providence, is the centre of the trade of the Bahamas (q. v.). It is pleasantly situated on the face of a hill, in lat.  $25^{\circ} 5' \text{ n.}$ , long.  $71^{\circ} 21' \text{ w.}$  Pop. 9000. The town is well laid out, has several handsome public buildings, and an excellent and well-sheltered harbor. The climate is very salubrious, and N. is a great resort of invalids from the north. It has extensive hotel accommodation, a lunatic asylum, and a leper-house, and is defended by two forts. N. exports cotton, pimento and salt. During the civil war in the United States, it became notorious in connection with the blockade runners.

NASSI'CK, or Nashik, a town of British India in the district of the same name, in the presidency of Bombay. 95 miles north-east of Bombay, on the river Godavery, not far from its source. It is a town of great sacredness in the estimation of the Hindus—more revered than even Benares—is a great place of pilgrimage, the chief seat of Brahmanism in the Deccan, and the residence of many families of Brahmans, some of them living in great affluence. It contains many temples, which are built along both banks of the Godavery, and on rocks in the river. They are all of black basalt, and dedicated to Shiva. Of far greater interest, however, are the Buddhist caves, about 5 miles from the town, which are situated in a conical hill at a height of about 100 yards from its base. They are rudely executed. The figures which they contain are in a state of good preservation, and the leading figures are those of Buddha; but the whole character of the remains is thought to indicate Buddhism in a state of transition or compromise with Brahmanism. One cave is 45 feet square, and its flat roof is wholly unsupported. Notwithstanding the Buddhist origin and character of these caves, the Brahmans of N., for the sake of gain, encourage the popular reverence for them. N. contains a resident pop. of (1872) 22,436.

NASTURTIUM. See CRESS and TROPÆOLUM.

NATAL. The region now forming the colony of Natal derives its name from its being discovered by the Portuguese on Christmas-day 1497. It was visited about

1822 by several white traders from the Cape, who found the country in possession of the Zulu chief Chaka, who ruled in a most sanguinary manner over all the tribes, from the Umzimvulu to the St Lucia River. He was killed and succeeded by his brother Dingaan in 1828, but the latter having treacherously murdered a party of emigrant Dutch Boers, who had paid him a friendly visit by invitation to buy land, he was attacked and finally destroyed by the Boers, who at that time had emigrated from the Cape Colony in large numbers, and who made his brother Panda paramount chief in his stead, and then settled themselves down in the country as his lords and masters. The British government, however, now interfered, and after a severe struggle on the part of the Boers, the country was formally proclaimed a British colony on the 12th May 1843, since which time it has progressed very satisfactorily. In 1856, it was erected into a distinct and separate colony, free from the control of the governor of the Cape. The attention of our colonial office has recently been called to the relations between the European and native population of N., by the case of Langalibalele, a Zulu chieftain, who, on slight grounds of suspicion, was treated very summarily by the colonial government, some of his people slain, and himself banished. The colonial secretary informed the government of the colony that their proceedings were illegal, and in 1875 Sir Garnet Wolseley was despatched to N. as temporary governor, and passed a Reform Bill likely to secure a more satisfactory state of affairs in regard to the position of the two races.

The colony of N. looks out on the Indian Ocean, being situated on the s.e. coast of Africa, about 800 m. n.e. of the Cape of Good Hope, between the 29th and 31st parallels of south latitude. Its n.e. boundary is the Tugela or Buffalo River, which divides it from Zululand, and its s.w. boundary is the Umzimvulu and Umiamous Rivers, separating it from Kaffraria proper. A lofty and rugged range of mountains called the Quathlamba, or Drachenberg, divides it from the Free State and Basutaland, and it contains a well defined area of 20,219 square miles.

These mountains are composed of a confused mass of granite, gneiss, sandstone, basaltic veins, and shale, and present both the flat top and serrated summits of the chain, of which they are a continuation, so well known in the Cape Colony as the Sneeuberg and Stormbergen. About lat. 28° 30', these mountains seem to reach their culminating point, and probably attain a height of 10,000 feet, forming a summit line of watershed, from which flow to all points of the compass the waters of the Orange, Umzimvubu, Vaal, Tugela, and other large South African streams. Towards the coast, these mountains present a scarped and almost inaccessible face; towards the interior, however, they gradually die away into the immense rolling plains of the Free State. Many offshoots from these mountains traverse the colony, dividing it into a series of steps or plateaux, gradually rising from the coast region to the foot of the mountains, and forming so many zones of natural productions.

The coast region, extending about 25 miles inland, is highly fertile, and has a climate almost tropical, though perfectly healthy. Sugar, coffee, indigo, arrowroot, ginger, tobacco, and cotton thrive amazingly, and the pine-apple ripens in the open air with very little cultivation. The midland terrace is more fit for the cereals and usual European crops; while on the higher plateau, along the foot of the mountains, are immense tracts of the finest pasturage for cattle and sheep.

The climate is very salubrious; the thermometer ranges between 90° and 38°, but the heat, even in summer, is seldom oppressive. The mean annual temperature at Pietermaritzburg, the capital, is 64° 71'. The winter begins in April and ends in September; the average number of rainy days being 13. In the summer season the thunder-storms are very frequent and severe. The annual rainfall on the coast is about 35 inches. Inland, it varies a good deal in different districts, and is greatest in summer. The south-east is the prevailing wind here in the summer months, as in the Cape Colony. Occasionally the sirocco or hot wind from the north-west is felt, which generally terminates in a thunder-storm.

N. has but one harbor on its coast, and that is D'Urban, or Port Natal, in lat. 31° 58'. It is completely landlocked, but a bar prevents vessels above a certain tonnage from entering. There is, however, generally a depth of water on it varying from 9 to 18 feet. There is secure holding ground in the outer anchorage. The harbor of D'Urban is of great importance to N., as it is the only one worthy of the name on the south-east coast. Many extensive engineering operations have been carried on with

the purpose of improving the harbor and increasing the depth of water at the entrance. The principal rivers are the Tugela or Buffalo, the Umcomanzi, Umgani, and Umsimela; like the majority of South African rivers, they are of no use for purposes of inland navigation; but their streams are permanent, and often available for irrigating purposes, thus giving N. in one very essential point a decided superiority over the Cape Colony.

Coal, copper-ore, iron, and other minerals are found in several places, and there is no doubt that, when the great mountain-range is properly explored, it will be found very rich in mineral wealth. Large forests of valuable timber abound in the kloofs of all the mountain-ranges, and many tracts along the coast are also well wooded. N. is divided into the following countries: D'Urban, Victoria, Alexandra, and Alfred on the coast region; Pietermaritzburg, Umcomanzi, and Umroli, central; and Klip River and Weenen at foot of the mountains. The capital is Pietermaritzburg, with about 6800 inhabitants, on a tributary of the Umgani River, about 50 mil. inland. It possesses a large military establishment, and many substantial public buildings. Its name is a compound of the Christian name of Pieter Rietief, and the surname of Gert Maritz, two celebrated leaders of the emigrant Boers who were murdered by Dugann. D'Urban, or Port Natal, is also a very flourishing town, having a railway connecting the landing-place at Point Natal with the town, and a population of (1872) 6276. It has 2 newspapers, and several banks and other public institutions. Verulam, Weenen, Richmond, Newcastle, and Ladysmith are also flourishing towns, and several other new villages have been recently formed.

N. is governed by a lieutenant-governor, aided by a legislative council, consisting of thirteen members appointed by the colonial office, and fifteen elected by the constituencies into which the colony is divided. Municipal institutions have been granted to the principal towns. It forms the diocese of a colonial bishop, and many stations of the Wesleyan, American, Norwegian, and Berlin missions exist. Education is receiving much attention, and schools are multiplying.

The De Beer and Bezuidenhout Passes are the only practicable roads across the mountains, and lead by very circuitous routes across the Free State into Cape Colony; and the numerous mountain streams wanting bridges render internal communication very difficult. Three lines of railway, of a total length of 104 miles, are in course of construction; the chief to connect D'Urban with the capital.

The principal articles of export from N. are wool, sugar, ivory, and hides. The wool exported to Great Britain in 1875 was valued at £514,810, and weighed 8,828,524 lbs. The total value of exports for the same year was £955,695. The exports comprise cotton, ivory, sugar, coffee, arrowroot, wool, hides, feathers, molasses, and rhinoceros horns. The value of imports in 1875 was £1,266,838. The revenue of the colony in 1875 was £260,271, principally raised from custom-duties, transfer dues, and taxes on native huts, &c. In 1848, the value of imports was £11,712, that of exports £1261, while the revenue was only £12,000. N. productions were very respectably represented in the Great Exhibition of 1862, and formed one of the most interesting of our colonial compartments. The population consists of Dutch Boers, who remained in the country after it became a British colony; of English and German settlers; and the remains of the Zulu tribes, who originally possessed the country. It numbered, in 1877, 35,512, of whom 22,654 were whites. The natives, the most industrious of the Kaffir races, possess horses, cattle, sheep, &c., valued at £1,500,000, and properly managed, make excellent servants.

The total tonnage of the vessels that entered and cleared the port of N. in 1875 was 137,227 tons, of which 121,822 were British. The discovery of diamond-fields on the Vaal River is an event in which the colony is deeply concerned.

The large animals are gradually disappearing, although elephants are still occasionally met with in the dense bush of the coast region. Lions, leopards, wolves, and hyenas still hang on the outskirts of civilisation. The smaller antelope are plentiful, and alligators are met with in nearly all the rivers north-east of the Umsimela. N., besides several poisonous snakes, produces a small species of boa, which sometimes attains a length of 16 feet. The hippopotamus is still found near the mouths of the rivers on the eastern frontier.

The botany of this region resembles that of Kaffraria proper, although generally of a more tropical character. All the timber-trees of the Cape Colony are found here,



Natal  
National

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besides many new ones. The climate of the coast region, however, is too warm for the grape, at least for the purpose of wine-making.

Brook's "Natal," by Mann (1869); Hall's "South African Geography;" "Natal Almanac" (1875); "The Cape and South Africa," by John Noble (1878).

NATAL, or Rio Grande do Norte, a fortified seaport of Brazil, capital of the province of Rio Grande do Norte, and built on low lands about three miles from the mouth of the river of that name, 100 m. n. of Parahiba. Pop. 10,000.

NATAL, John William Colenso, D.D., Bishop of, a divine of the Church of England, was born in 1814, and educated at St. John's College, Cambridge, where he graduated as Second Wrangler and Smith's prizeman in 1836. From 1838 to 1842, he was one of the masters of Harrow School, and for the next four years, tutor of St. John's College. In 1846, he was appointed rector of Forncett St Mary, in the county of Norfolk, and in 1864, first bishop of N., South Africa. The works by which he was, until recently, most widely known were his two treatises on Algebra and Arithmetic. The treatise on Algebra was first published in 1849, and that on Arithmetic in 1863. They soon acquired great popularity, and have been adopted as text-books in many of the principal schools and colleges in Great Britain. He has also published other educational works. He first attracted public notice, however, by the dedication of a volume of Sermons to the Rev Mr Maurice (q. v.), at the moment when that gentleman was in disgrace with the "orthodox" section of the religious world. His affection and respect for Mr Maurice were further shown by his edition of the "Communion Service, with Selections from Writings of the Rev F. D. Maurice" (1855). In the same year appeared his "Ten Weeks in Natal;" in 1861, his "Translation of the Epistle to the Romans, commented on from a Missionary Point of View;" and "A Letter to his Grace the Archbishop of Canterbury, upon the Question of the Proper Treatment of Cases of Polygamy, as found already existing in Converts from Heathenism," in which he recommends, on grounds both of reason and Scripture, that Converts to Christianity, already possessing several wives, should not be forced to put them all away, except one. He admits that monogamy is most in harmony with the genius of Christianity, but would enforce it only in the case of those who married after their conversion. The outcry raised by his professional brethren against the "Letter" was sufficiently loud, but it was nothing to the tempest of disapprobation that burst forth in the following year (1862), when he published "The Pentateuch and Book of Joshua Critically Examined," in which he endeavored to prove that, as they stand, these books are not the products either of the age to which they are usually assigned, or of the authors whose names they bear; and that they are not entirely historical, but in many most important passages are overlaid with legendary, mythical, and symbolical incidents. Part VI. of this work was published in 1872. The Bishop of Cape Town, the metropolitan bishop, declared Colenso deposed from his see; but on an appeal to the Privy Council in 1865, the deposition was pronounced null and void. In 1874, Colenso visited England to plead the cause of Langalibalele (see NATAL). Other works by the bishop are "Natal Sermons" (1866); and "Lectures on the Pentateuch and the Moabite Stone" (2d ed., 1878).

NATANT. See NAIANT.

NATATORES (Lat. swimmers), the name given by Illiger, and many other ornithologists, to the order of birds called *Palmipedes* (q. v.) by Cuvier.

NATCHEZ, a city and port of entry in Mississippi, U. S., on the east bank of the Mississippi River, 230 miles north of New Orleans. It is finely situated on the bluff, 150 feet high, which here forms the bank of the river. A portion of the town at the bottom of the bluff is called Natchez-under-the-Hill, and was formerly the resort of the river gamblers, pirates, and other desperate characters. The city has eight churches, a court-house, jail, United States Marine Hospital, a daily and two weekly papers. It is the shipping port of a large and fertile cotton district, and has steam-boat connections with the whole Mississippi valley. N., which derives its name from a noted tribe of Indians, was settled by the French in 1716, and destroyed by the Indians in 1729, who were subsequently defeated, and banished to the West Indies. Pop. in 1870, 9057; 1880, 7038.

NATION (Lat. *natio*, from *natus*, born), a word used in two distinct senses. 1.

A state or independent society united by common political institutions; 2. An aggregate mass of persons collected by ties of blood and lineage, and sometimes of language. The modern dogma of nationalism, as maintained by a class of continental politicians, starts from an assumption that a nation in the latter sense ought necessarily to be also a nation in the former, and endeavors to assign limits to the several races of Europe, with the view of erecting each into a distinct state, separated from other states or nationalities. The extreme politicians of the national school seem to consider the supposed rights of nationalities as paramount even to the obligations of treaties, and the political conjunction of one nationality with another is looked on by them as an adequate ground for a revolt or separation, apart altogether from the question whether the nationality is well or ill governed. In point of fact, the different races in Europe are so commingled, that any reconstruction of the political map of Europe, on ethnological principles, would be impossible, even if desirable. The blood of nine-tenths of Europe has been mixed within the historical period. The test of language, on which nationality has sometimes been based, is a deceptive one, in so far as it is indefinite and perpetually fluctuating. The people on the frontier between two races, as in the South Tyrol, generally speak two languages. Then we have dialects, like the Walloon, the Gröduerisch of the Tyrol, and the Romansch of the Grisons—as also the Breton, Welsh, Gaelic, and Irish languages, which could hardly be made the basis of independent communities. The wellbeing of the people governed is properly the end of all government, and it has practically not been always found that a state is better governed when it consists of one race only, than when it includes an aggregate of races. Highly diversified nationalities may be united in one political system, provided only that the government respects and consults the peculiarities of the several races, and does not attempt to force the usages, habits, or language of one on the rest. See ETHNOLOGY.

**NATIONAL CONVENTION**, an assembly of deputies of the people, which assumed the whole government of France on the overthrow of the throne in 1792. When the National Assembly (see ASSEMBLY NATIONAL) had decreed the suspension of the king, 10th August 1792, it appointed the election of the N. C., which commenced its sittings 21st September. Its first act was to declare France a republic, 25th September. Upon this followed the trial and condemnation of the king. Through the support of excited mobs, the extreme Jacobin party became predominant in the Convention; where, from the elevated seats on which its members sat, it received the name of the *Mountain* party. The *Revolutionary Tribunal* was established; the chief administration of affairs was intrusted to the *Committee of Public Safety*, which exercised the most despotic powers. The Girondists (q. v.), at first a powerful party in the Convention, were destroyed, many of them perishing by the guillotine; and a new constitution, thoroughly democratic, was adopted, 16th August 1793; but its operation was suspended until peace should be restored. Meanwhile, the actual rulers of the country displayed marvellous energy; almost a million of citizens being placed under arms, and immense provision of all warlike stores made by means of requisitions. They also proceeded with merciless severity against their political opponents, dealing with them as traitors; hundreds of thousands were thrown into prison, and the number who died by the guillotine increased daily both in Paris and throughout France. The N. C. itself latterly became subject to the dictatorial power of Robespierre; many of its members were guillotined within a few weeks; and independent opinion was no longer expressed. The overthrow of Robespierre was followed by a great reaction; the Jacobins were suppressed; and finally the N. C., after concluding peace with Prussia and Spain, dissolved itself 26th October 1795 (4th Brumaire of the year IV.), leaving to the nation a new constitution, which placed the government in the hands of a Directory (q. v.).

**NATIONAL COVENANT**. See COVENANT.

**NATIONAL DEBT**. See DEBT, NATIONAL.

**NATIONAL EDUCATION**. The general subject of Education has been already treated under that head. By the term "National Education" is understood (1) the means taken by the body of any nation, either through the state or other organisations, for educating the people; (2) the objects which the nation ought to place before itself in its educational measures. These questions involve the whole inner and outer history of education, and are far too large and important to be capable of such

treatment here as would convey accurate notions to the reader. All we can do is to glance slightly at the history of the two branches into which the subject divides itself. Among ancient nations, and among not a few nations now existing, education in any definite sense did not, and does not, exist for the masses of the people. The children grow up in reflective or unreflective imitation of their fathers. But at all times, nations which have quite emerged from the savage state, have had some more or less organised scheme of education for the leisured and governing classes. The purpose kept in view in such education has been to fit the pupils to discharge certain duties of war or government. In addition to this, the priesthood had the education which their traditional hymns, laws, and customs afforded. That man as such, apart from any special practical ends, should be educated, was an idea late of being recognised, and occurred first to the Greeks, to whom the world owes so much. But neither among them nor their imitators, the Romans, was the education of the masses of the people ever contemplated. Education, properly so called, was confined to a few. In the centuries which succeeded the introduction of Christianity, the church was the great educating body—training those intended for the service of the altar, not only in Christian doctrine, but in all the learning of the past. This, at least, was the general tendency of education in the church. But it was not till the Reformation in the 16th c. that learning, even to the limited extent of reading and writing, was considered a worthy object of pursuit by any save those who, in some form or other, were destined to be drawn within the clerical ranks. The Reformation introduced the idea of educating the masses of the people—the leaders of this movement being, no doubt, forced to this conclusion by the necessity which their view of man's personal religious obligations imposed on them. It was manifestly a corollary from the position they took up that every man's intellect should be so trained as to be able to read, and inquire, and think for itself. It was only very slowly that so large a conception of the sphere of education could be given effect to. Gradually, however, popular schools arose in many parts of the continent of Europe, especially in Germany, and the number of gymnasia or grammar-schools was, during the same period, increased. In Scotland, so early as 1666, the government took up the matter, and ordained that there should be a school as well as a church in every parish, at the same time providing for their maintenance by a tax on land, and for their management by putting them under a certain number of those who paid the tax conjointly with the minister of the parish—all being subject to the presbyteries within whose bounds they were situated. The example of Scotland cannot be said to have been followed on anything like a national scale by any country till after the French Revolution had exhausted itself. Since 1815, the distinguishing idea of government administration may be said to be the necessity of educating the people, and all the people—even the outcast and the criminal. During the last fifty years, all the German states, and more especially Prussia and Saxony, have developed excellent national systems of education, and France has followed their example. Russia and the new Kingdom of Italy are also now organising primary instruction; and at the same time, as in all European countries, they are making provision for the instruction and professional training of the teachers in Normal Schools (q. v.). The schools for instructing the middle classes, and grammar-schools (French, *lycées*; German, *gymnasiums*), whose object is to prepare pupils for the universities, have received increased attention. Universities themselves, too, have been further developed, their curriculum extended in range, their objects elevated, and their number increased.

To return to primary instruction. In England there was no national system, properly so called, before 1870, but voluntary efforts were largely aided by the state in the form of Privy Council grants. These grants were also extended to Scotland, as it became necessary to supplement the parochial schools there, owing to the increase of population. The principal conditions on which these grants were made were, that they were only to supplement local efforts, that the schools should pass a satisfactory examination before a government inspector, and that the Bible be read in them. As much additional religious instruction might be given as the school-managers pleased, but no schools were admitted to Privy Council aid from which the Bible was excluded. Under the stimulus afforded by these grants, the educational wants of England were, after 1839, to a great extent supplied; but many districts were left unprovided with schools, and many more very badly supplied. In

1870, an important measure, entitled "An Act to provide for Public Elementary Education in England and Wales," was passed by parliament, according to which it is enacted that "there shall be provided for every school district a sufficient amount of accommodation in public elementary schools available for all the children resident in such district, for whose elementary education efficient and suitable provision is not otherwise made." It is enacted further, that all children attending these schools, whose parents are unable, from poverty, to pay anything towards their education, shall be admitted free, and the expenses so incurred be discharged from local rates. The new schools are placed in each district under "school-boards" invested with great powers—among others, that of compelling parents to send their children to school. An act in most respects similar to the above was passed in 1872 for Scotland, whose educational wants had previously been well supplied.

In Ireland, a national system instituted and maintained by the state exists, and one of its main features is the separation of the religious from the secular teaching—at least in theory. The extent to which this principle has been encroached upon in the course of working out the scheme, is not accurately known, but is worthy of special inquiry.

In the British colonies, as in the United States of America, adequate state systems of education have been provided on the basis of the secular principle. See the articles NATIONAL EDUCATION, and PRIVY COUNCIL, COMMITTEE OF, ON EDUCATION.

**NATIONAL EDUCATION**, Systems of, the provision made by various states for the education of their citizens. In England, the term national education is commonly used as implying only a provision made for the instruction of children of the poorer classes. But it is capable of a much more extensive application, and in most of the countries in which the state provides for the education of the people, the state regulates, more or less, all instruction, from that of the primary school to that of the university. In England national education has no existence. The Parish Schools (q. v.) of Scotland at one time made a near approach to being national, but the altered religious circumstances of the country have made them cease to be so. The imperfect means adopted to supply the deficiency in both parts of the kingdom, are described under the head of PRIVY COUNCIL, COMMITTEE OF, ON EDUCATION. See also SCHOOLS, PUBLIC AND GRAMMAR; INDUSTRIAL SCHOOLS; REFORMATORY SCHOOLS, &c. In Ireland the foundation of a really national system was laid in 1833 in the "National Schools" (supplemented since by the Queen's Colleges and University), the principle of which is briefly stated under IRELAND. These schools have exhibited a steady and even surprising progress, when we consider the determined opposition they have met with from powerful ecclesiastical parties, both Catholic and Protestant. In several of the British colonies the local legislatures have boldly dealt with the question on the national principle, in opposition to the denominational. See VICTORIA. As this is likely to be one of the first important subjects to come before the reformed parliament, it may be opportune to give our readers a sketch of what some neighboring nations have done in regard to it. Before entering upon the description which we propose to give of the principal systems of national education, it will be proper to give some account of the obstacles which have hitherto prevented the establishment of a national system among ourselves, and to indicate some of the matters as to which we have to look for instruction from foreign experience.

And, first, in Great Britain the establishment of a national system of education, and of all interference with education on the part of the state, has until lately been opposed upon principle by a numerous and respectable body of politicians. They for the most part consisted of Dissenters of the middle class, who, beginning with Voluntaryism in ecclesiastical matters, had passed on—at least the leaders had—to the doctrine of *laissez faire* in politics. The others were chiefly speculative persons, deeply imbued with the same doctrine, who, profoundly disbelieving in the wisdom of statesmen, and the capacity of officials, and apparently in the possibility of foresight in large affairs, held that the state should undertake as little as possible, and leave things to what they called their natural course. The arguments used by these two classes were not always alike. Individuals of the former class were apt to go back to the religious ground from which they started, maintaining that education ought to be religious, that the state ought not to teach religion, that

therefore education was out of the province of the state. But what the spokesmen of both classes most insisted on was this, that education should be left to the law of supply and demand, or rather, to the voluntary action of individuals, single or combined. It was in that way, they declared, that the education of the people could be most beneficially carried on; for so carried on, it would always be, both in kind and in extent, what, on the whole, the circumstances of the people required. In the hands of government, they said, an educational system must be, more or less, an instrument of state. And at the best, the extent and the quality of the instruction provided must depend upon the will of persons who might be very ignorant of the wants of the people. They used declamation about the bad way in which governments did everything they attempted; about the danger of creating a host of new officials; and about the impropriety of interfering with natural laws and of discouraging voluntary agency. Then they enlarged upon the great progress which education had made in England since the beginning of this century, independently, as they said, of the state—maintaining not only that it had been as great as the circumstances of the country permitted, but that it was almost as much as the state had accomplished in any country; and that it proved that in England, supply and demand, or the voluntary principle, would soon provide for the education of the whole people. The greater part of the increase in the supply of education, so far as it was not due to the action of the state, had come from the benevolent exertions of individuals. But their chief reliance was upon the agency of individuals or societies inspired by benevolence or religious zeal. They held that the same objections did not apply to voluntary organisations which lay against the state; they declared that it was the great glory of England to accomplish by such means things which elsewhere were attempted only by the state. Combined voluntary action, they said, was consonant with the national habits and institutions; it was a part of the system which had made the English a free, self-reliant, and enterprising race; it should be fostered, not discouraged; and it was worth our while to pay a price if necessary, rather than let it be superseded by the action of the state.

It was answered, first, that the commercial principle of supply and demand, unless supplemented by the benevolence of individuals, could not be expected to educate the people except by very slow degrees; that education must create the demand for education; that children of the lower classes in large towns, unless assistance or stimulation came to them from without, had at present no more chance of receiving instruction than if they were living in Africa. And the nation would lose incalculably by delay in educating the masses; for nothing would so greatly increase its power and prosperity, so materially improve the condition of the humbler classes, as the education of the whole people. The importance of voluntary agencies was admitted; but why was the state to be precluded from at least co-operating with them? The state, it was said, had a greater interest in educating the people than any of her citizens could have; and, moreover—this was the real question—could undertake it more successfully. Voluntary agency, it was maintained, was too slow, too uncertain, too spasmodic in operation, to be permanently and solely relied upon in a matter of such great national concern. The friends of state action confidently appealed to the experience of foreign countries as shewing the superior efficiency of state education, and pointed to the effects which government stimulation on a limited scale, had had at home. It is now several years since this controversy was at its height. The Voluntaries have since that been acquiescing in the interference of the state with education; and recently, several of their foremost men have frankly admitted that they had been mistaken, and that the state, by what it has done for education, has made good its claim to the regulation of it. The course of political events has recently added greatly to the importance of popular education; and at present it may be said that there is practically no opposition upon principle to the control of education by the state.

There have always, however, been obstacles to the establishment of a national system more formidable than the opposition of the Voluntaries, and these appear to remain unabated.

The most important of them are those which are concerned with the place, if any, to be assigned to religion in the school instruction. Upon this matter, there is a conflict of opinions which seems almost irreconcilable. A party, which is growing

in numbers, and which is respectable from its activity and intelligence, holds that the state should give nothing but secular instruction; that religion is beyond its province, and should not be taught within its schools; that, indeed, with a population divided into numerous sects, a practicable scheme of state education, embracing religion cannot be devised. To this party, a portion of the English Voluntaries now seems disposed to ally itself. There are others who believe it possible to teach an undenominational Christianity in schools; who desire that the state schoolmaster should confine himself to this; and that dogmatic teaching should be left to the religious bodies. A third party hold that dogmatic teaching should be given in state schools; that religious teaching, to have any value, must be dogmatic; but that arrangements might be made for the religious instruction of children by persons of their own persuasions; and, at anyrate, that children should be exempted from the religious instruction given in a school, if their parents should so desire. The most numerous body of all are satisfied with the system of aiding denominational schools which now exists; because they approve of schools being, as for the most part they now are, under clerical supervision, and fear that by any change the influence of the clergy upon education would be weakened. Among the managers of Church of England schools, fault is scarcely found with more than one point in the present system; there is an incessant agitation against the "Conscience Clause," which the state has placed among the conditions of its aid, by which it is stipulated that religious instruction shall not be given contrary to the wish of the parent. Between the Denominationalist and the Secularist there is a difference which scarcely admits of compromise; and until they agree, a national system is hardly possible. The former would most probably oppose any scheme for supplementing the Denominational system—for the purpose of educating the classes which this system does not educate—unless it were to include religious teaching.

The question of religious instruction has been found a troublesome one in nearly every country where the state regulates education, and there is nothing more instructive, in foreign experience, than the ways in which, in different systems, this difficulty has been disposed of. Next to this, the most important thing to be observed is, the parts which, in different systems, are assigned to the state and to the locality respectively; for it is unquestionable that there are some dangers attaching to state education, when the influence of the state is predominant, and that the function of the state in education must be carefully defined. By the mere selection of schoolbooks, the state could powerfully influence the rising generation; and in Austria, and, it is said, in France also, the school has been made use of as an instrument of state policy. With a popular government, however, there is not much risk of it being used for sinister purposes; and in this country, we are in more danger of having recourse too little to the powers of the state than of trusting it too much. The possibility of making education compulsory, is another matter upon which foreign systems of education throw much light: we are perhaps more interested in noting how far indirect methods can be resorted to for compelling attendance at the schools. Upon the limits of the instruction which should be attempted in schools for the poorer classes—a subject which has been much discussed in connection with the Revised Code of 1861—and upon the results of government regulation of the middle and upper schools also, there is much to be learned from the foreign educational systems. We begin with

#### *State-education in Holland.*

There are several countries in which—if school statistics could be taken as a test—popular instruction is more widely diffused than it is in Holland; but in no European country is it so uncommon to meet a man who cannot easily read and write. The primary schools of Holland have a high reputation for the solidity of the instruction they impart, and have, by competent observers, been declared to be the best in Europe. A small and wealthy state—rich, too, in the public spirit of its citizens—with a population singularly docile and orderly, the task of educating the people has been for Holland exceptionally free from difficulty. It had the start of most other European nations in the work of popular education. So far back as 1811, its primary schools had been celebrated in a Report by the famous Cuvier. It has had an educational law since 1806; and of this law, though it underwent modification in

1857, it is necessary to give some account. Its author was M. Van Den Ende, who, from 1806 till 1833, had the superintendence of popular education in the country.

On the face of it, this law seemed far from making a complete provision for the education of the people; it left much—in any other country, it would have been a great deal too much—to the public spirit of local authorities. It did not make education compulsory; it did not even enforce the establishment of public schools; but it provided for two things being done thoroughly—the inspection of the schools and the examination of the teachers—and to this seems to have been chiefly due its eminent success. Each province of Holland was formed into a certain number of school-districts, and over each school-district was placed an inspector. The inspector was made supreme over primary instruction in his district. He was a member of every school-committee, and school-committees could be named only with his concurrence; no teacher, public or private, could exercise his calling without his permission; and he inspected every school in his district twice a year. The united inspectors of the province formed the provincial commission for primary education. This commission met three times a year, and received from each of its members a report upon his district; once a year, it sent a deputy to the Hague, to form, with the deputies from other provinces, a commission to discuss and regulate school-matters, under the direction of the Minister for the Home Department and his Inspector-general. The inspectors in the various provinces were appointed by the Home Office, on the presentation of the provincial commission. It has been said that in Holland public spirit is very strong. State-employments are thus deemed very honourable; and the inspectors gave their services gratuitously—receiving only an allowance for expenses. It was one of the duties of the provincial commission to examine teachers for certificates. First, the teacher had to get a *general admission*—a certificate of competency, admitting him into the teaching profession; he had to get a *special admission*, also, before he could exercise his profession. There were four grades of certificates—the first or second grade had to be obtained by a school-master, public or private, in the towns; the third grade qualified for a village-school; the fourth grade was for under-masters and assistants. To the highest grade were admitted those candidates only who gave signs of a *distinguished culture*. For public masterships, when they fell vacant, a competitive examination was held; the successful candidate received his *special admission*—his appointment to exercise his profession in the school. For special admission as a private teacher, there was no second examination; it was in the power of the municipality, with the concurrence of the inspector, to grant it upon application. Although there were no obligatory provisions in the law, the provincial and communal administrations were charged by the government to provide the means of instruction in their localities, to insure a comfortable subsistence for teachers, and to obtain a regular attendance of the children in the schools; and they did all this to the best of their ability. Free schools for the poor were provided in the towns; in the villages, schools to which the poor were admitted gratuitously. Every effort was used, both by the lay authorities and the clergy, to draw poor children into the schools; and the schoolmasters were provided with incomes much superior to what is usually paid to schoolmasters in any other European country. To this M. Cuvier attributed much of the success of the Dutch schools. Some of the best scholars were kept in the school to assist in the teaching; they became under-masters, and eventually masters; and thus, even before the institution of normal schools, an efficient body of teachers was provided. In the normal schools which were afterwards established, school-methods and the practice of teaching formed a more prominent part of the instruction than in those of other countries. It soon appeared, that the free schools for the poor in towns were giving better instruction than could be obtained by the lower middling classes; and intermediate schools had to be established in the towns (*tusschen-schoolen*), in which, for a small fee, an excellent education was provided. Above the intermediate school was the French school, in which, besides a sound commercial education, modern languages were taught; above that was the Latin school, giving a classical education, and preparing for the universities. The classical schools and the universities of Holland do not receive from foreign observers the commendation so freely bestowed upon the other parts of the educational system of the country.

Under this law, the public schools were non-denominational; no dogmatic in-

struction was to be given by the teacher or in the school; but the instruction was to be such as to "train its recipients for the exercise of all social and Christian virtues. The religious education of the children, however, was not overlooked. The government exhorted the clergy of the different communions to take upon them the religious instruction of children of their own persuasions; and this the clergy willingly did—giving up a portion of every Sunday to this duty. The schoolmaster instructed the children in the truths common to all religions, and on Saturdays, when the Jews were absent, in the New Testament and the Life of Christ. M. Cuvier, in 1811, stated that he found the education religious, though not dogmatic; and in 1834, high satisfaction with it was expressed by M. Cousin, an earnest advocate of religious education. It was thought that the Dutch schools had proved the possibility of teaching in schools an unsectarian Christianity. But it was chiefly upon this point that the controversy arose which led to the enactment of 1857; and as regards it, it cannot be said that the controversy is yet ended.

There were other matters which excited a demand for the alterations then made in the law. The constitution of 1848 had granted the liberty of instruction, and was therefore in conflict with the law of 1806. The school attendance had been falling off. Some of the municipalities had been evading their duty to the schoolmasters and the schools. It was thought desirable that the duties of the commune in regard to education should be carefully defined by law. The changes made, however, were not of much practical importance.

The law of 1857 granted "liberty of instruction;" still requiring from the private teacher the certificate of competency, it rid him of the veto of the municipality and the inspector. It expressly prescribes that primary schools, in each commune, shall be at the commune's charge; they are to be in sufficient number; and the states' deputies and the supreme government are to judge whether, in any commune, they are in sufficient number or not. If the charge of its schools is too heavy for a commune, it receives a grant in aid, of which the state and the province each contributes half; but there is no fixed point at which the commune can demand this aid. The law fixes the minimum salary for a schoolmaster at 400 florins (about £84); for an under-master at 200 florins. (The schoolmaster's salary, however, is usually much higher; in towns, not unfrequently four times as much.) It provides that when the number of scholars exceeds 70, the master is to have the aid of a pupil-teacher; when it exceeds 100, of an under-master; when it exceeds 150, of an under-master and pupil-teacher; for every 50 scholars above this last number, he is allowed another pupil-teacher; for every 100 scholars, another under-master. School-fees are to be exacted only of those who can afford to pay them; and the municipalities are enjoined to "provide as far as possible for the attendance at school of all children whose parents are in the receipt of public relief." The law defines the subjects of primary instruction as follows: Reading, writing, arithmetic, the elements of geometry, of Dutch grammar, of geography, of history, of the natural sciences, and singing. There is still a competitive examination for the office of public schoolmaster; a list of those who have acquitted themselves best is made up by the inspector and a committee of the communal council, and from this list the selection is made by the whole body of the council. For the provincial commission, consisting of the inspectors of the province, there has been substituted a salaried provincial inspector; and the provincial inspectors are assembled once a year to deliberate upon the state of primary instruction. The Minister of the Home Department, assisted by a referendary, is the supreme authority in matters connected with education.

Upon the subject of religious instruction, the law was left unaltered. The enactment of 1857 provides as follows: "Primary instruction, while it imparts the information necessary, is to tend to develop the reason of the young, and to train them to the exercise of all Christian and social virtues. The teacher shall abstain from teaching, doing, or permitting anything contrary to the respect due to the convictions of Dissenters. Religious instruction is left to the different religious communions. The schoolroom may be put at their disposal for that purpose, for the benefit of children attending school, out of school-hours." This was the conclusion arrived at, after much excited discussion.

In 1848, all religions were, in Holland, placed by the law on a perfect equality; and immediately thereafter, an attack was begun by the Roman Catholics on the reli-



gious instruction of the schools. Professedly neutral, they maintained that it was really Protestant, and probably they were right. The schoolmasters, on the demand of the Roman Catholics, were enjoined to comply more strictly with the law; add thereupon there began among the orthodox Protestant bodies a violent agitation against the law—a movement for connecting every public school with some religious communion. The Roman Catholics, believing that in Holland neutral schools must be Protestant, desired that the instruction should be purely secular; and a considerable party among the Protestants contended for the same object. The only party in favor of the existing law were the Rationalists or New-school Protestants, who attach more importance to the moral and civilizing side of Christianity than to its dogmatic aspects. Between the Denominationalists on one hand and the Secularists on the other, the victory fell to this last party. Of course, the decision was a compromise; and neither the High Protestant party nor the Roman Catholics regard it with satisfaction. The consequence has been that, advantage being taken of the newly-conceded freedom of instruction, there has been a great increase in the number of private elementary schools conducted on the denominational basis. The non-denominational school in Holland cannot be considered entirely successful, since the opposition to it seems to be leading to primary education being to a considerable extent taken out of the control of the state.

*State-education in Switzerland.*

In no part of Europe has the education of the people been more successfully prosecuted than in Switzerland. In all the cantons, French and German, it has been carefully attended to by the governing bodies; and for small communities, provided the rulers have intelligence and public spirit, it is comparatively a simple and easy task. To those who are interested in school-methods and school-management, nothing can be more instructive than the education of the German cantons. Their primary schools are unsurpassed; those of the canton Aargau have the reputation of being the best in Europe. The experience of the French cantons throws light upon more than one of the questions which occur in the construction of a national system. It is with the latter class of questions that we are concerned; and to the French cantons—Geneva, Vaud, Freiburg, Neuchâtel, and the Valais—the following statement is confined.

In these five cantons, the school-system was, until recently, the same in its main outlines; it was a system designed to put public education in harmony with the democratic constitutions established after the war of the Sonderbund. In Vaud, it was founded in 1846; in Geneva and Freiburg, in 1848; in the Valais, in 1849; and in Neuchâtel, in 1850. In Freiburg, it underwent modification in 1856. Its main features were as follows: The communes were required to provide and maintain public schools, the state assisting them when the charge became too heavy. In general, every place with more than 20 children of school-age was required to have its school; every place with more than 50 or 60, a second school; and so on. Infant-schools were recommended and aided by the state, but their establishment was not made obligatory. The council of state—the supreme executive—of the canton appointed a Board of Public Instruction to exercise the government of education; but in important matters, an appeal lay from this body to the council; and by the council only could a master be dismissed. The municipality appointed a communal school-committee, which had the local superintendence of the schools. Ministers of religion were eligible for this body, but were not members of it by virtue of office. It was the duty of the school-committee to visit the schools of its commune not less than once a fortnight, besides holding a public general examination of them once a year. The teacher required to get a certificate of capacity; the examinations for the certificate being under the management of the Board of Public Instruction. In Vaud, however, five years' service in a public school exempted a teacher from the obligation of a certificate; and in other cantons, it does not seem to have been rigidly insisted on. For vacant masterships, there was a competitive examination, to which persons qualified by certificate or service only were properly admitted; in Vaud, however, failing qualified persons, other candidates might be admitted to examination, and provisionally appointed. In Geneva, Freiburg and the Valais, there were school inspectors who periodically reported to the Board of Public Instruction; Vaud and Neuchâtel had no inspectors; the duty of inspection in these

cantons devolved upon the school-committee. The subjects taught were religion, reading, writing, grammar, arithmetic and book-keeping, geography, Swiss history, and singing. The instruction given had two or more degrees (in Geneva, six degrees), according as these subjects were taught with more or less extension; instruction in both degrees being usually given in the same school, and by the same master. Education was to be based upon the "principles of Christianity and democracy." Hours were to be set apart for religious instruction; from the ordinary school-leisure dogma was to be strictly excluded; and it was regarded as the province of the minister of religion, not of the schoolmaster, to give religious instruction, though the latter was not prevented from giving it in the room of, and under the responsibility of a minister. In all the cantons, except Geneva, education was made compulsory; attendance at school was required from the seventh to the fifteenth, or from the eighth to the sixteenth year. If children were privately educated, the state must be satisfied that their education was sufficient; such children could be called up for examination with the scholars of the public schools, and if found inferior, might be transferred to a public school. A certificate of emancipation was granted when the obligatory course had been fulfilled. The law contemplated that the instruction should be gratuitous, and in Geneva and the Valais it was gratuitous.

In Freiburg, the school-system was framed in no small degree for the purpose of strengthening the democratic party against the clerical party. It provided that no religious society should be allowed to teach; that persons educated by the Jesuits should be incapable of holding any office in church or state; it imposed a political oath upon the schoolmaster; it prohibited children from being sent to a private school, except with the sanction of the inspector and the school-committee; and if sent, required that they should come up for examination every half-year. At the same time, it established an excellent programme of primary instruction. At the elections of 1856, the clerical party regained the ascendancy in Freiburg; and in January 1858, the council of state made a considerable alteration in the school-law. It reduced the programme of primary instruction; it made the clergyman a necessary member of the local school-committee, freed the teacher from the necessity of taking an oath, and relaxed the obligation of attendance at the public schools, giving parents liberty to educate their children at home or at private schools. In other respects, the system, as above described, has been maintained in Freiburg. There has been no change in the other cantons.

The law as regards religious instruction seems to work with tolerable smoothness. In Vaud, it appears that the laxity which prevails as to the requirement of a certificate sometimes leads to the admission of unqualified persons as teachers; and in Vaud and Neuchâtel, complaint is made of the incapacity of the school-committee to make up for the want of professional inspection.

In the four cantons in which education is by law compulsory, the school-attendance is found to be no better than in Geneva, where it is not compulsory. In these cantons, the law provides that parents not sending their children to school are to be warned; if the warning be neglected, that they are to be summoned before the tribunals, which can punish them by fine or imprisonment. But it appears that, in point of fact, the tribunals are never resorted to; and that the authorities are careful not to insist upon more than the people are easily able and willing to comply with. In the Valais, the school-year need not last for more than five months. In Freiburg, the vacation may last for three months; and the inspector may exempt from attendance at school children who are sufficiently advanced, and children whose labor their parents cannot do without. In Vaud, the local school-committee may grant to children above twelve years of age, whose labor is necessary to their parents, dispensations which in a great measure exempt them from attendance at school; the master may grant the scholar leave of absence for two days in the week; the president of the school-committee may grant him leave for a week at a time; the school-committee itself for a month at a time. It appears that in Vaud, the attendance at the schools had been steadily falling off from 1846, the date of the law, up to 1868; and the attendance of the children whose names were on the books was then reported to be by no means regular. New branches of industry which gave employment to children had been introduced into the canton; and the Council of Public Instruction seems to have been compelled to sacrifice the law to the interests of families.

The experiment of compulsory education cannot be said to have succeeded, because it has not really been made, in French Switzerland.

*State-education in France.*

At the head of the education of France is the Minister of Public Instruction; he is advised and assisted by the Imperial Council of Public Instruction, a body the members of which are appointed by the crown for the period of a year. The minister, if he thinks fit, brings before the council for discussion projected laws and decrees on public education; he is bound to consult it respecting the programmes of study, methods, and books to be adopted in all classes of public schools. The minister has succeeded to the functions in respect of education which, under the first Empire, were conferred upon the University of France; he is head of the university, the officials of which still perform a considerable part in the management of education, but do so under his control. As respects the higher and the professional education, the university is both a teaching and an examining body, granting degrees under conditions prescribed by the minister and council. The administration of the secondary instruction is committed to it, and it shares in the supervision of the primary instruction. It is composed of 18 *Academies*, each of which comprehends several departments. These academies are so many local centres of the Department of Public Instruction. At the head of each is a rector; the chief officials under him are called Academy inspectors. The Minister of Public Instruction is also rector of the Academy of Paris.

The Academy officials, under the control of the minister, have the superintendence of secondary instruction in the departments within the Academy's jurisdiction; there is an inspector for each department. The instruction is minutely regulated, as to the quantity to be provided, as to the subjects to be comprehended in it, and as to its cost; it is the chief duty of the Academy inspectors to see that the requirements with respect to it are complied with. The inspection is said to be highly efficient. The lyceum is the principal seminary of secondary instruction; in general, the chief town of every French department has its lyceum. There is, besides, the communal college. Every town of considerable population has its communal college. The lyceum is founded and maintained by the state, with aid from the department and the commune; the communal college is founded and maintained by the commune, with occasional aid from the state. The instruction given in the communal college and in the lyceum is substantially the same in character; in the lyceum it is the more extensive. To the lyceum there is usually attached a preparatory school for the younger boys. In both lyceums and communal colleges, there are boarders and day-scholars. French, Latin, Greek, and mathematics are the principal subjects of instruction; arithmetic, history, geography, modern languages, and the natural sciences are also taught. The course at the lyceum lasts for six years, and qualifies for the degree of Bachelor of Letters. Religious instruction is given—to the Roman Catholic boys, by chaplains attached to the school; to the Protestants, by a Protestant minister, specially appointed to this duty; and the New Testament in Greek or Latin is read daily by every class. In the lyceums, the average charge for day scholars is from 110 francs (£4, 7s. 4d.) to 180 francs (£7 8s. 4d.) a year; the charge for boarders from 800 francs (£32) to 900 francs (£36), according to their age and advancement. In Paris, the charges are higher—from £38 to £60 a year for boarders, and from £6 to £12 a year for day scholars; on the other hand there are lyceums where the highest charge for boarders is £22 a year. There are public scholarships (*bourses*) founded by the state to be obtained by competition, the holders of which are relieved from all cost. The education given is in no respect much inferior—and in some respects it is superior—to that which is to be had at an enormous cost at the best English public schools; it is far superior to that which, at a far higher cost is ordinarily given to children of the middle classes in England. A private secondary school cannot be opened without notice to the public authorities; they must be satisfied that the premises are suitable; and the director must have a certificate of probation—showing that he has served five years in a secondary school—and a certificate of competency obtained at the public examination for secondary teachers. The Academy inspector inspects private secondary schools, but only to see that the pupils are properly lodged and fed, and that the teaching contains nothing contrary to morality and the laws. The minister may, however, dispense

with the certificate of probation, and holy orders are accepted in lieu of the certificate of competency.

A law, dated 21st June 1865, founded a new course of study in secondary schools—a special secondary instruction. The object of the special secondary instruction is declared to be to “found the sub-officers of industry;” instruction in living language is substituted for the classical instruction of the secondary schools; the elements of science and its applications receive great attention—particular regard being had to the teaching of agriculture and the sciences which bear upon it. The teaching, moreover, is intended to impart what may be called a sound French education. A normal school has been founded at Cluny for the preparation of masters for this special secondary instruction.

For primary instruction in France, an excellent basis was laid by M. Guizot's law of 1833, of which, indeed, the more important provisions have been retained. The body of legislation actually in force consists of the law of March 15, 1850, the organic decree of March 9, 1852, the law of June 14, 1854, and the law passed during the year 1867. The law requires that every commune shall maintain an elementary school, either by itself, or in combination with other communes; in founding and maintaining its schools, it is to be aided, if necessary, by the department and by the state. It must have taxed itself specially for the schools three centimes per franc of rental before it can claim aid; the department must have taxed itself specially two centimes for the communal schools before the state is resorted to. Up to the present year, a certain number of poor children—the number determined for each school by the prefect of the department—were admitted to the school gratuitously; for others, a fee was charged, which was collected every month by the tax-gatherer. The state contributed whatever was necessary in addition to the communal and departmental taxation and the school-fees. The law of the present year, however, provides that all children are to be admitted gratuitously whose parents would have difficulty in paying the school-fee; and that a commune whose taxation amounts to four centimes additional may dispense with the school-fee altogether, the deficiency, if any, so arising being made up by the state. In the large towns, the schools have long been gratuitous—the communes often taxing themselves, for school-purposes, beyond the amount required by law. Up to the year 1867, the law did not oblige the communes to maintain separate schools for girls, though a large proportion of them contributed towards the maintenance of such schools. The law of 1867 provides for the establishment of girls' schools; the cost of them—the communal and the departmental taxation being in most places previously exhausted—will fall in a great measure upon the state.

Religious instruction is given in every school. In France, the Roman Catholic, the Protestant, and the Jewish forms of worship are subsidised by the state; and it is provided that, in communes where more than one of these is publicly professed, each form is to have its separate school. The departmental council, however, has power to authorise the union, in a common school, of children belonging to different communions. For such cases, it is provided that ministers of each communion shall have free and equal access to the school, at separate times, to attend to the religious instruction of members of their own flock. To a school appropriated to one denomination, no child belonging to another is admitted, except at the express demand of his parent or guardian, signified in writing to the teacher. Denominational schools are now the rule, common schools the exception. Previously to 1850, under M. Guizot's law, common schools were the rule, but it was found that in them the religious instruction presented grave practical difficulties. All the religious bodies appear to be satisfied with the present system. The schools, though denominational, are communal schools; the denominations have not the management of them; and they are all subject to the same inspection.

The mayor and the minister of religion in each commune have the supervision and moral direction of the primary school; in practice, they are strictly confined to matters connected with its morality. Cantonal delegates are appointed by the departmental council (the canton is a division larger than the commune), who inspect the primary schools of their canton; but they have no real authority over the schools; they are only allowed to make representations as to the state of the schools to the departmental council, or to the inspector. The departmental council has the chief part in the regulation of the primary schools; moreover, no private primary

school can be opened without its permission; and if it refuse permission, there is no appeal. It is the prefect, however, who has the power of nominating, suspending, and dismissing public primary teachers. His authority is usually exercised upon the report of the Academy inspector—the university official whose important functions, in respect of secondary instruction, have already been described. The academies have the charge of the normal schools of primary instruction, and the supervision of the primary schools as regards the methods of teaching and course of study. Under them are the primary inspectors, who report to the Academy inspectors; above the latter, as regards primary instruction, there are four inspector-generals, attached to the office of education at Paris. It is the primary inspector who really superintends the instruction of the schools; his labors are unceasing, his inspection is a reality, for he is not required to give notice of his visits. The private primary schools are subject to his inspection, but only as regards the provision made for the bodily health and comfort of the pupils and the maintenance of morality.

The subjects which must be taught in every primary school, in addition to moral and religious teaching, are reading, writing, arithmetic, the elements of French grammar, and the French system of weights and measures; there are other subjects which are facultative—which, in whole or in part, may be taught, that is, if the council of the commune should so desire, and the departmental council give its consent. These facultative matters are the applications of arithmetic; the elements of history and of Geography, the elements of physics and of natural history; elementary instruction in agriculture, the arts, and hygiene; surveying, levelling, drawing, singing, and gymnastics. For girls, there are superior primary schools which teach the facultative matters only, and in girls' schools, instruction is usually given in needle-work for about three hours a day.

For the preparation of male teachers the law requires every department to maintain a normal school; in some cases, however, two departments are allowed to maintain one jointly: there are now 70 of these schools. There are separate normal schools for female teachers; of these, the number was recently 84; now that the law is about to add largely to the number of girls' schools, it will probably be increased. The members of the religious orders devoted to teaching, which perform a great part in primary education, are trained for their duties in the establishments of their respective orders. (Of these orders, the most important is that of the Brethren of the Christian Schools). The instruction of the normal schools is meagre; it scarcely exceeds the subjects of primary instruction; a considerable proportion of the students, indeed, acquire only an imperfect knowledge of the facultative subjects. School-method is what in the normal schools, it is deemed most important to teach. The examination for primary schoolmasters—which is conducted by a commission appointed by the departmental council—is limited to the subjects taught in the schools. There are two classes of certificates, according as the teacher passes in the obligatory subjects only, or in the whole or part of the facultative subjects also. Every male teacher, public or private, is required to have the certificate of capacity granted after an examination; also, excepting in the case of religious persons, a certificate of morality. The law recognises a certificate of stage to be granted to assistants who have served as such for three years, as a substitute for the certificate of capacity; but this provision has been unpopular, and the qualification of stage is practically unknown. Female lay teachers require the certificate of capacity; female teachers of the religious orders are exempt from it. No person can be appointed a regular communal teacher unless he be twenty-four years old, and has served for three years since his twenty-first year as an assistant, or as a *supplying* teacher. The supplying teacher gets a lower salary, and may be employed in the poorer communes. The salaries are low even in the towns: in many of the country communes, the legal minima are not exceeded: these are—for an ordinary communal teacher, £34 a year; for a female teacher, or a supplying teacher, £20 a year. The commune pays £8 a year, besides the school-fees; whatever is required to make up the legal minimum, the government supplies; and, since 1862, the government has, upon certain conditions, made slight allowances in addition to the minimum.

It is in secondary instruction that the education of France has a decided superiority over that of England. The primary instruction is scarcely equal to that given

in English schools of the same grade. Mr Matthew Arnold has reported that in 1859, he found in French primary schools the writing fair, but scarcely so good as in English schools; the reading better, the arithmetic much better than in English schools. Of history and geography, the pupils were far more ignorant than English school children of the same age. The ministry of M. Dorny, however, has been an era of improvement; much more attention is given to the facultative matters now; especial attention to agriculture and the subjects connected with the daily life of the peasant. Mr Arnold came to the conclusion, that even in the great towns there were no masses of children left altogether uneducated, that almost all passed at some time through the schools. Adult classes, taught in the evenings, have greatly increased in numbers of late years, and are now aided by the state.

In 1834—just after the passing of M. Guizot's law—the number of primary schools, public and private, was 10,316; in 1857, it was 65,100; in 1872, it was 70,180, of which 88,980 were boys' or mixed schools, 17,460 girls' schools, and 11,000 were free schools. In the primary schools alone there were, in 1872, 4,722,000 scholars—3,500,000 more than the number of scholars in 1829. In 1872, the year of the census, a careful inquiry was made into the condition of the French people with regard to primary education. Of the total population above the years of childhood, it was found that 30.77 per cent. could neither read nor write, 10.94 could only read, and but 58.29 could do both. There was a most extraordinary difference between one department and another in this respect, the percentage of utterly illiterate persons ranging from 6.9 per cent. in Doubs, to 61.8 in Haute-Vienne; the most favorable figures indicating universally the north-eastern departments. In 1872 the state and the communes expended 85,000,000 of francs on primary education alone. The item of public instruction stood at 49,211,000 in the budget of 1877. For the means of higher education in France, see UNIVERSITY OF FRANCE.

#### *State-education in Prussia.*

In all the Protestant states of Germany, the school-system in its main features is the same. The Prussian system—more celebrated, more extensive, more practical and thorough than the system of the minor states—always powerfully influencing these, and now likely to influence them more than ever, is that which must be selected for description. About this system, M. Cousin, by a strange confusion between it and a project of law—a mere scheme drawn up by the education minister, Von Altenstein, never even proposed for legislation—spread misconceptions throughout Europe, which have scarcely yet been dispelled. It has been greatly changed, greatly improved since Cousin wrote in 1831; but it does not yet in symmetry and completeness approach to what he described.

In Prussia, there is a Minister of Public Worship and Instruction; but the official who under him carry on the government of education are the officials of the Department of the Interior. At the head of the government in each province is a president; over each of the departments into which the province is divided there is a prefect (*bezirk*); each of these officers is assisted by a council, of which one section, called *Schulcollegium*, forms a separate council for deliberating upon the local school-affairs. One member of the school-council, called provincial school-councillor, is associated with the president for administrative purposes: the prefect has attached to him two departmental school-councillors, one Protestant, one Catholic, to advise with him, and to administer the school-affairs of their respective communions. There is practically a division made of educational affairs between the officials of the province and those of the department. The provincial school-councillor takes the charge of secondary education within the province; the departmental school-councillors the charge of the primary schools of the department.

Over each of the circles into which the department is divided is an officer, termed a *Landrath*, who reports to the prefect of the department. With the landrath, in the management of primary schools, is associated the *superintendent*, the church dignitary of the circle. The superintendent is *ex-officio* inspector of the primary schools within the district. The parish clergyman is *ex-officio* local inspector of primary schools within his parish. There is also for the school or schools of each parish a board of managers, the composition of which varies in different provinces. The clergyman is always a member of it; he is usually chairman. In country places the whole powers of the board are often left in his hands.

In the "exterior" affairs of the school—passing school-accounts, visitation of school-premises, control of the school-estates, adjustment of the school-rate, &c.—the landrath is associated with the superintendent. Its "interior" affairs, all that concerns its teaching and its discipline, are, subject to the established regulations, under the superintendent's control; but, in practice, they are more under the influence of the departmental school-councillor. The superintendent, however, is required to visit the schools, and to watch over the conduct of the local inspector, and he reports annually to the government of the department. The local inspector's province is the interior affairs of the school. He is expected to visit the schools diligently, and to be active in the supervision of them. The religious teaching of the children is almost entirely done by him, it being his duty to prepare them for confirmation, which comes at the end of the school-period. To qualify them for the duty of school-inspection, the candidates of theology are required to attend for six weeks as auditors at a normal school, and to have attended a course of *Pädagogik* at the university. Nevertheless, it appears that many clergymen are very ill fitted for this work, and their powers of interference are often exercised in ways annoying to the master, and detrimental to the school. The "exterior" affairs of the schools of a parish belong to the board of managers.

This board is usually composed of representatives (1) of the patrons, if any, of the school; (2) of the parochial clergy; (3) of the municipal body; (4) of the householders. It has a stated meeting once a quarter; it meets whenever it is summoned by the chairman. It manages the revenue and expenditure of the school, in respect of which it is responsible to the landrath; it is the trustee of the school-buildings and property. It is its duty to see that the regular school-hours are kept; that no unauthorised holidays are given; to it application must be made for dispensations for periods exceeding a week. Its members should be present at all examinations and other public solemnities of the school. In the large towns, there are school-delegacies appointed by the *Magistrat*, whose powers are more extensive, and are in practice the greater, because in the large towns the pastors pay little attention to the schools. The school-delegacies have control over the higher as well as the primary schools which their constituents maintain; two paid members—school-delegates—who must be members of the *Magistrat*, exercise the greater part of their authority. Under the delegacy, for every school there is a school-board, consisting of the clergyman and two lay members, whom the delegacy appoints. The delegacy itself is accountable to the magistrat, and both are subordinate to the provincial council.

Every commune is bound to find school-room and teachers for all the children of school-age belonging to it. The amount of the teacher's stipend is in every case fixed by the departmental government; there is no legal minimum; the salaries are usually very low. Some parishes possess endowments; but, in general, the cost of maintaining the schools is defrayed by means of (1) school-fees, (2) a local rate, (3) a grant from the national treasury. As children are only expected to pay what they can, and as the state grants aid only after the strictest proof of the incapacity of the commune, the weight of the burden falls upon the local rate. The maintenance of the schools ranks with the first charges upon the local purse. The teacher is appointed by the departmental councillor; in a few towns, however, a certain power of choice is allowed to the municipal authorities—they may select one from a number of candidates presented to them by the government.

School-attendance is by law compulsory for eight years; the school-age beginning at the completion of the fifth year. But in most parts of Prussia, children, though allowed, are not compelled to attend till the completion of their sixth year. The school-period closes with confirmation. A register of all children of school-age is made up—usually at the police office; every child is registered for a particular school; there, whatever his rank, he must attend, unless a dispensation be got for him from the landrath. When a dispensation is applied for, the parents must state the motives of the application, and the provisions to be made for the child's education. All persons officially connected with schools are expected to use their influence to secure regular attendance; but failing moral suasion, there are other means of enforcing it. The schoolmaster keeps a list of absences, excused and inexcused. When a child's attendance is irregular, the board of managers admonishes its parent. If admonition—which in general is repeatedly resorted to—has no effect, a statement is sent to the police-office; the parent is fined a small sum for each day of the child's absence

since the last admonition; and the fine can be levied by execution, enforced by imprisonment, or taken out in parish labor. It seems that very few children escape registration; but the regularity of the attendance—in general it is very regular—varies considerably in different districts; the execution of the law being strict or otherwise according to the temper of the people, their circumstances, and the vigilance of the school authorities. There are no statistics by which the success of the law can be exactly tested. In some of the larger towns, the demand for child-labor and the growth of pauperism are adding to the difficulty of enforcing it. Prussia has a factory-law requiring that every child employed in a factory shall attend school for three hours a day, and this law is strictly enforced.

Teachers of every class, public and private, have to pass two examinations. Certificates are of three degrees of merit—they may be marked "very well qualified," "well qualified," or "sufficiently qualified." The heads of examination are "religion, the German language, the art of school-keeping, geography of Prussia, arithmetic and geometry, knowledge of natural objects, writing, drawing, singing and the theory of music, organ." After the first examination, the candidate is eligible as an assistant or provisional master; he must serve in this capacity for three years before taking the second; he must pass the second within five years. The second examination is in the same subjects; but now most weight is given to the art of school-keeping. Of the subjects taught in primary schools, the principal is religion; the others are reading, writing, arithmetic, singing, and the elements of drawing. Incidentally, the teacher may communicate information about natural phenomena; about geography, beginning with that of the locality and the history of Prussia. The teaching was much more ambitious before 1854; before 1854, also, the normal schools, now limited to a meagre programme, were universities on a small scale, aiming at the mental training of their students, rather than at fitting them to teach elementary schools. The change is often ascribed, both in Prussia and out of it, to political motives, having been made by a party unfriendly to popular education; but eminent educationists defend and approve it. The schools, they say, are now attempting as much as can be thoroughly done in the time allotted for primary education, and are doing it thoroughly; while the showy teaching of former times, with its endeavor to develop the faculties, and to communicate knowledge, neglected the indispensable elementary instruction, and, as regarded the greater number of the scholars, was in no respect successful. The normal school training, it is said, now fits the teacher for his duties and his position in life; formerly, it rather unfitted him for them, while fitting him perhaps for something better. It is, however, admittedly a defect in the Prussian system that it offers to the humbler classes no opportunity of carrying their education beyond the point at which the elementary schools leave it. In some of the towns, there are improvement institutes, where young persons are taught in the evenings or on Sundays; but they attempt little, are badly organised, and are neglected by the school administrations. It should be stated that the town schools often teach somewhat more than is taught in country places—more geography, history, and natural knowledge—but this, though permitted, is not encouraged by the authorities. Grammar is entirely excluded from primary instruction. The only part of the teaching which is less than excellent is the writing: it has been stated that upwards of 50 per cent. of the recruits are unable to write—the art never perfectly mastered, being lost, it must be supposed, through want of practice.

As regards religious instruction, the rule is, that the primary school is denominational—public schools are set apart, that is, for children of each of the religious bodies; the clergyman who has the charge of the school is the clergyman of the body to which it is appropriated. Besides the "Evangelical Establishment," in which Lutherans and Calvinists are combined, there are the Roman Catholics and the Jews to be provided for; of other sectaries, there are not 10,000 in all Prussia. The Lutherans and Calvinists are combined in the school as in the church. Dissenters are allowed to withdraw their children from the religious instruction, and have it given by their own pastor. Any commune may establish a mixed school, if it so desire, and if the authorities permit; but, in practice, mixed schools are only to be found where it would be very inconvenient to establish a school for each body. In mixed schools, the teachers are chosen proportionately from each of the two great religious bodies; if there be only one teacher, it is, in some districts at least, customary that he should be alternately a Protestant and a Catholic. The experi-



ment of mixed schools had a long trial in Prussia, and was found to be unsatisfactory, leading to attempts, or suspected attempts, at proselytism, and to parish squabbling. It has been abandoned, not so much from the wish of the government, as in deference to the feelings of the people, and to the demands of the Roman Catholic hierarchy. But the denominational system is more in accord with the part which the state assigns to religion in the school. The school, it is said, should be the organ of the church for training children to church-membership; school and church are expected between them to form the child into a man contented with his position in life. Religious teaching must be given by the master for an hour every day. In the Protestant schools, the master teaches the Lutheran catechism to Lutheran children; the Heidelberg catechism to the Reformed children. Scripture history is also taught; and hymns, from a prescribed collection, have to be committed to memory. The master is not allowed to expound the catechism; his duty is to see that the children learn it, and understand the words in which it is expressed. It is the clergyman who explains its doctrines to the elder children in preparing them for confirmation.

Any one may open a private school of any class in Prussia who can obtain a licence for the purpose from the government; but in the city, it must be shown that the district in which the school is to be placed is insufficiently supplied with schools; and every private teacher must have passed the two examinations. Private schools are subject at all times to the inspection of the school-councillor, and are bound strictly to follow the regulations established for private schools. The larger towns in Prussia are not yet adequately supplied with public primary schools; private primary schools are therefore common in such places: in Berlin, they educate nearly half the children who are in primary schools.

Of the secondary and higher education in Prussia, a brief and general notice must suffice. It has already been stated that the superintendence of the secondary schools is undertaken by the school-councillor of the province; it is independent of ecclesiastical control. The larger communes and the towns are required to maintain middle schools, giving instruction of a higher order than is given in the elementary schools, a sound German education, and preparing boys for the gymnasia. These must be provided to the satisfaction of the authorities, according to the wants of the population. They are maintained, like the primary schools, by school-fees, local taxation, and these falling, the state treasury. Some of the larger towns maintain also secondary schools of a higher class; these are of two kinds—the real-school, and the gymnasium or grammar-school. In such towns, as stated already, the local management rests with the school-delegacy. There is, besides, a considerable number of real-schools and gymnasia which are entirely in the hands of the government. None of the real-schools take boarders; very few of the gymnasia do so. The gymnasium is a classical school preparing for the universities. In the real-school, mathematics, scientific studies, and modern languages are substituted for the classics, and the instruction is designed to prepare the pupils, as far as possible, for the pursuits of life. The real-schools grant certificates to their pupils. The royal real-schools and the gymnasia (other than those maintained by the large towns) are under the management of the provincial school-councillor. Some of the older of those gymnasia have endowments, but the money necessary for their support is contributed by the state. Appointments to the schools are made by the school-councillor; he appoints the teachers, or nominates the list out of which local authorities have to choose, in all the secondary schools. Teachers for all the schools have to pass two examinations. There are boards of examiners, appointed by the provincial government, which conduct the examinations; these boards also examine the students of the gymnasia, to test their fitness for the university. The university in Prussia is a teaching (or rather a lecturing), as well as an examining body, and grants degrees in four faculties—Theology, Jurisprudence, Medicine, and Philosophy. There are seven universities within the territory held by Prussia before the war of 1866; in two of these—Breslau and Bonn—there is a Roman Catholic as well as a Protestant institute of theology. The university affairs are administered by a commissioner appointed by the crown; all their regulations are prescribed, and all the appointments in them made by the state.

#### *State-education in the United States.*

In the United States, the education of the people is out of the sphere of the

central government; it ranks among the domestic affairs of the several states, and it is chiefly in the Northern States—those from which, before the late war, slavery was excluded—that systematic attempts have been made to promote it. The central government has, however, in more than one instance endeavored to assist education in the states, by providing for it endowments. In the states which contain waste lands, it puts aside, in every newly-surveyed township of six miles square, one square mile, for the support of schools within the township. The state becomes trustee of this land, or of the price obtained for it, which is usually called the Township Fund, and pays over the yearly income to the township when it has been settled. The central government, about 1836, had accumulated in its treasury a considerable balance, the surplus of its income over its expenditure during several years: this it apportioned *pro rata* among the states, reserving the right to reclaim it. This right has not been, and is not likely to be exercised; and in most of the Northern States, the income of the "United States Deposit Fund" is applied to the support of education. Since 1864, by what is called the "Agricultural College Act," the central government has made a liberal offer of allotments of land to the states upon certain conditions, for the endowment of one or more institutions in every state, in which—whatever the other instruction may be—special attention shall be given to those branches of learning related to agriculture and the mechanic arts. Several states are preparing to avail themselves of this offer.

Every one of the Northern States has its common schools. Before the war, Kentucky, Missouri, and Louisiana had each some kind of school-system; at various points throughout the South, particular towns had established schools, always after the model set in the Northern States. The new state of Western Virginia has passed a school-law since the conclusion of the war. In the Northern States, besides the endowments above described—both of which are possessed by most of the states—every state possesses a school-fund arising from various sources—sale of lands, taxation, penalties, and forfeitures—which is usually vested either in the state legislature or in a Board of Education. In one or two of the states, the income of this fund is considerable, but in general it is small. It is usually, but not in all the states, applied solely to the support of public schools, or of the normal schools which help to provide them with teachers. Apart from the influence exercised by means of this fund, the state usually promotes public instruction only by its legislation, by which it requires or enables local bodies to make certain provision for the education of children within their jurisdiction. Everywhere, the law leaves much, and usually the practice leaves everything, to the local bodies; and these come short of, or exceed the legal requirements according to the local interest in education and ability to pay for it. It is through the interest of the municipalities in education that very ample provision is made in the towns; it is through the force of example, and in deference to educational experience, that a certain uniformity of system prevails. There is a close approach to uniformity both in the law and in the practice of the several states; and a description of the system of one state will be approximately true of that of other states. The Massachusetts system is fittest to be selected for description, as being the oldest, the most celebrated, that which on our side of the Atlantic is most identified with the common schools, and perhaps on the whole the most successful. Some of the principal variations from it will be noted.

In 1642—twenty years after the landing of the *Mayflower*—the Massachusetts colonists passed a law requiring every citizen, under a penalty of 20s., to teach his children and apprentices, or have them taught, to read perfectly the English language. Five years later they passed another law, requiring, under penalty, every township containing 50 householders to support a teacher to teach their children to read and write; requiring every township containing 100 householders to maintain a grammar-school capable of fitting youths for the university. The present law is different, if not less liberally conceived. The change was made by numerous steps, and was probably forced on by the circumstances of the community. The law, as it now stands in the revised statutes of the state, provides that in every township the inhabitants shall maintain for at least six months in the year a sufficient number of schools for all the children of the township. The teachers are to be of competent ability and good morals, and they are to teach orthography, reading, writing, English grammar, geography, arithmetic, the history of the United States, and good behavior. Other subjects—algebra, vocal music, drawing, physiology, and hygiene—are to be taught or not at the discretion of the local committee. Every township

may, and every township containing 500 householders must, also maintain for ten months in the year a school which shall give instruction in general history, book-keeping, surveying, geometry, natural philosophy, chemistry, botany, the civil polity of Massachusetts and of the United States, and the Latin language. And in every township containing 4000 inhabitants, the teacher must be competent to instruct in the Greek and French languages, in astronomy, geology, rhetoric, logic, intellectual and moral sciences, and political economy. Moreover, any township may establish schools for children over 15 years of age, determining the instruction to be given, and appropriate money for their support. The compulsory part of the law is supported by penalties, but it is said that there would be difficulty in enforcing them; at anyrate, they are not enforced. It is also provided that every child between 8 and 14 must be sent to school for at least 12 weeks in a year: the penalty for breach of this provision is 20 dollars, but the idea of enforcing it seems never to have been entertained; its existence even is not generally known. The law does not permit school-fees, or, as they are called in America, rate-bills. There seems to be no fund arising from waste lands in Massachusetts; and the township raises the necessary funds by a tax upon property—the personal property of the inhabitants and the capitalised value of their real property situated within the township. The amount of the rate is by the law left wholly undetermined: it is determined by the householders at their annual meeting. The state endeavors to influence the townships to make a liberal provision by means of the school-fund, a share of which is given to every township which has made its returns to the Board of Education, and has spent not less than at the rate of a dollar and a half per head for all the children of the township. The school-fund contribution is very small—less than a quarter-dollar for every child; but it is said to have an excellent influence upon the rural townships. No doubt, the publication of the returns made to the Board of Education tends to spur on the backward districts.

The management and control of all the public schools of a township are placed in the hands of a school-committee, consisting of any number divisible by three; the members of this committee hold office for three years, and one-third of them are elected annually at the annual meeting of the township. The committee have the supervision of the schools; and it is among their duties to see that no book calculated to favor the tenets of any particular sect of Christians shall be used in the schools, and to require the daily reading of some portion of the Bible in the common English version. Any township, by its public meeting, or a city, by its city-council, may require the committee to appoint a paid superintendent of schools: when this is not done, the members of the committee receive a small allowance for the time during which they are engaged upon the school-affairs. But, moreover, any township may, at a meeting called for the purpose, resolve to divide itself into districts for the support of its schools. If this be done, the township names for each district a "prudential committee," consisting either of one or of three persons, resident within the district, which is charged with providing and keeping in repair the school-house, at the expense of the district, and, if the township so determines, with the duty of selecting and contracting with the teachers. The district determines the amount to be raised by it for the building, or repair or furnishing of its school; this is collected by the township collector, and handed over to the district-committee. The school-committee retains its functions of management, except so far as they have been made over to the districts; and hence, there is a double management of the schools, which is found to be attended with inconveniences. The division into districts, too, is said to have led to an unnecessary multiplication of schools in country places; people scheme to have the township so divided that there may be a school in their neighborhood—there are therefore more schools than are needed, and more than can be maintained in efficiency. The school-committee—in cities, the school-superintendent—examines the teacher before his appointment, and grants him a certificate which remains in force for a certain time. There are three classes of certificate—one valid for six months, another for twelve, a third for two years. The common schools of a township are open to all children resident therein between five and fifteen years of age: none are to be excluded on account of race, color, or religious opinions; and it has been held that a child unlawfully excluded may recover damages therefor in an action of tort.

In New York, in Pennsylvania, and in most of the Western States, large mun-

cial powers are possessed by the county, and the county shares with the township the management of school-affairs. New York has a state superintendent, whose power over the schools is considerable. In that state, it is the school-commissioner of the "Assembly District" in which the township lies who divides the township into school-districts; and it is the district which determines the school-tax: the township is almost completely ignored. In New York, Ohio, and Illinois, it is by county officials that teachers are examined and certificated. In New York, Rhode Island, and Connecticut, "rate-bills"—that is, school-fees—are allowed, and are usually levied. Several states besides Massachusetts make school-attendance compulsory: in most of the states, there appears to be some provision against "truancy," but it appears that attempts are not made to enforce the law except occasionally, in the case of homeless, wandering children, who are liable, in lieu of a fine, to be sent to reformatory schools. It has been calculated that in the city of New York (pop. 940,000) there are about 100,000 children who do not go to school—though in no city is there a better or ampler provision of common schools.

As might be expected, the school laws work badly in country districts. The householders are disposed to be satisfied with any kind of school, provided it be cheap, and within easy reach of them; and the multiplication of schools by the district system, makes it almost unavoidable that an insufficient sum should be spent upon each school. The teachers—a vast majority of whom are women—being wretchedly paid, are badly qualified; they are constantly changing; scarcely any intend to make teaching their occupation for life. Few of them have been trained for their work—the normal schools which exist being utterly inadequate to supply the demand for teachers; and the examination by a rural school-committee affords but a slender guarantee of competency. The teacher is usually "boarded round" among the farmers of the district, and is said to be treated by them with much observance; but his income—putting a money-value upon the board—has been estimated at an average of about \$50 a month, and that only during the time that the school is open. In 1864, in 84 townships of Massachusetts—more than a fourth of all the townships in the state—the schools were kept open for less than the statutory period of six months. The teaching is said to be wonderfully good, considering the scanty pay given; but where the vacations last for more than six months, and the teacher is changed almost every term, thorough and systematic instruction is scarcely possible. It is in the towns that the working of the school-laws has been creditable and successful. Through the high public spirit of the municipal bodies, and the great importance attached to education, the support of the common schools is in general most liberally provided for.

In the towns, there is usually a superintendent of schools, by whom, under and in co-operation with the general and district school-committees, the schools are inspected, and the character of the instruction determined; by him the examination of the teachers also is conducted. Of the schools, there are four classes—primary, intermediate, grammar, and high-schools or academies. Children usually enter the primary school about 5 or 6; the grammar-school between 8 and 9; the high-school between 12 and 13 years of age. They are not promoted from one class of school to another without undergoing an examination; the intermediate schools, where they exist, are intended for those who are too old to be at the primary school, and too backward to enter the grammar-school. To be admitted to a grammar-school, a child must be able to read at first sight easy prose, to spell common words of not more than three syllables, and to have acquired a slight knowledge of arithmetic. For admission to the high school, the usual requirements are ability to read correctly and fluently, an acquaintance with the simple rules of arithmetic, and some knowledge of geography and grammar. From these tests may be inferred the average proficiency expected to be attained by children leaving the primary and the grammar school respectively. In the grammar-schools of Boston, the programme of studies consists of spelling, reading, writing, arithmetic with book-keeping, geography, English grammar, the history of the United States, natural philosophy, drawing, and vocal music: this is nearly the usual programme; but in New York and one or two other states a little more is attempted. Between the high-schools or academies in the various states, there are considerable differences. In the city of New York, for example, the Free Academy has pretensions to the rank of a university, and grants degrees in arts and science (Bachelor of Arts, Bachelor of Science, Master of Arts) to students who have completed with credit the curriculum of five years. But, in

general, the high-schools are schools of secondary instruction, intended to prepare youths for the university—instruction being given in the classical languages, mathematics, the sciences, history, and the English language and English literature. The usual curriculum is one of four years; and the students are not required to study all the subjects taught in the school. At Boston, where boys are admissible to the Latin high-school at 10 years of age, the curriculum lasts for six years. There are high-schools for girls as well as for boys, the programme of instruction being the same in both. At Boston, the curriculum at the girls' high-school lasts for three years; and pupils at admission must be between 15 and 19 years of age. Boston possesses, besides its Latin high-school, and its girls' high-school, an English high-school, said to be admirably planned and conducted. The instruction in it closely resembles that given in the real schools of Germany, including French and German, and various sciences, with their application; being intended to enable boys to complete a sound English education, and to prepare themselves for commercial life. Great complaints are almost everywhere made—Boston seems to be exceptional in this respect—of the irregularity of the attendance at the primary schools. It is estimated that in most states not much more than half of the children pass from these to the grammar-schools; but a trifling proportion of the grammar-school pupils enter the high-schools, and of these, only a small fraction persist to the end of the curriculum. All high-schools grant certificates of graduation to pupils who have creditably gone through the course of study. The study of the classics does not, even in the most pretentious institutions of this class, seem to be carried very far, much more attention being given to mathematics and natural science. In Boston—in many respects the most favorable example that could be taken—there were, in 1864, 32,814 children of school-age—between 5 and 15; of these, 26,960 were in school, the average attendance being 25,617. The number enrolled at the three high-schools was only 726, and the average attendance 691. The number of students who complete the five years' curriculum of the New York Free Academy seldom exceeds fifty. Among the wealthy, there is said to be a growing disinclination to make use of the common-schools: their children are usually sent to private academies. The only serious opposition to the non-religious character of the common-schools comes from the Roman Catholic clergy, but it is stated that there is a growing feeling upon this subject among some of the other religious bodies. In many of the New York schools, in which the majority of the children are Roman Catholic, clerical influence, insufficient to impress upon the education the religious character which it would approve, has obtained, with the tacit assent of the school-authorities, the disuse of the daily Bible reading which the law prescribes.

The primary and grammar schools are most frequently mixed schools—that is, they admit boys and girls; in the teaching, however, the sexes are kept apart. The teachers in primary and grammar schools, even in the towns, are usually women; but in Boston the principal of a grammar-school is always of the other sex. The schools are in towns always *graded*—divided, that is, into classes composed of those who are at the same stage; each grade forms a separate department of the school, and is taught by a separate master. The usual number of pupils allotted to a teacher is in the primary schools about 50; in the grammar-schools about 85. This system of grading is a cheap system, because it enables a teacher to take charge of a large number of pupils; but it is said to lead to a want of thoroughness in the instruction, the teaching being addressed to the class rather than to the individual members of it. Want of thoroughness seems, indeed, the besetting sin of American teaching, which aims too much at communicating knowledge, not sufficiently at developing capacities. In the primary and grammar schools, the education costs from 25s. to 30s. per head; in the high-schools, from £6 to £10 per head.

#### *Statistics of National Education.*

The proportion of children attending school—I. e., enrolled in school-registers—to the whole population of the countries under mentioned may be approximately stated as follows: England 1 in 7·7; Scotland, 1 in 6·5; Prussia, 1 in 6·27; France, 1 in 9; Holland, 1 in 8·11; Belgium, 1 in 11; Northern States of the American Union, 1 in 4·5; Switzerland, 1 in 7; the minor Protestant states of Germany, 1 in 6·7. These figures, however, must not be taken as indicating the comparative diffusion

of education in the countries named: nor are they to be relied on as indicating with anything like exactness, the comparative proportions of children actually attending school; for the proportion of the children enrolled which on the average is in actual attendance varies in different countries. It should also be borne in mind that averages conceal the condition of the worst parts of a country: in Scotland, for instance, where the school attendance varies from 1 in 4 of the population in the best districts, to 1 in 15, 1 in 20, and even to 1 in 30 in the worst.

See the Reports of the assistant-commissioners appointed to inquire into the State of Popular Education in England, vol. iv., being vol. xxi. part iv. sess. 1861; the second Report of the Scottish Educational Commissioners, 1867; the Statistical Society's Quarterly Journal for March 1867; Horace Mann on Education in European Countries; Fraser's Report on American (U. S. and Canada) Schools; Cousin on German and Dutch Education; M. Block's Abstract of Public Documents relating to Education in France; "L'Instruction du Peuple," par Pierre Tempels (Bruxelles, 1865); "Statistische Nachrichten über das Elementar Schulwesen," an official return, which gives a complete survey of elementary education in Prussia to the end of 1864; "Congrès International de Bienfaisance de Londres, Session de 1862;" and "Rapport et Discussion sur l'Instruction Obligatoire."

[Since the preceding account was written, the claims of national education have been more fully recognised, and, with less opposition than might have been expected, a national system has been established in England and Scotland. The Elementary Education Act for England, 1870, enacts that every district in which the existing schools are found deficient shall have a popularly elected school-board, to manage its rate-supported schools, levy school-rates, appoint teachers, &c. Elementary schools are to be supported, and the expenses of school-boards paid, out of funds called school-funds. The local rate forms the nucleus of each school-fund; but every school under the act is likewise entitled to an annual grant from parliament not exceeding the income of the school from other sources, and varying in amount according to the number of pupils and their proficiency as tested by different standards of examination. Schools are to be open at all times to government inspection. Religious instruction, if given at all—and this is left to each board to decide—is to be given at fixed times other than the ordinary school-hours, when no child is compelled to attend. It is further left to the discretion of school-boards to make education compulsory.—The Scotch Education Act, 1872, differs materially from the English act on three points only: first, by providing that a school-board, under the Scotch Education Department, is to be elected in every parish and burgh; secondly, by making it illegal for parents to omit educating their children between 5 and 13 in reading, writing, and arithmetic; and thirdly, by comprehending higher-class schools. Otherwise, the acts are much alike. Every school is to be open to children of all denominations, and religious instruction is only to be given before or after ordinary school-hours. Provided they conform to the "conscience clause," school-boards may make any provision they please for religious instruction. School-boards are enjoined to relieve the teachers of higher-class schools, so far as may be, from elementary work.]

**NATIONAL GUARD**, an organization for local defence, differing from the British Militia and Volunteers, in being at the disposal of the municipalities, not of the crown. Italy, Greece, and other nations have maintained this civic force; but the country whence it derives historic fame, is France. The French N. G. was instituted in Paris in 1789 when the government had an army of 30,000 at the gates. The municipality armed 48,000 men, and their example was followed by the chief towns of France. These corps obtained the name of N. G. and assumed the famous tricolor as their ensign. In 1795, 30,000 of the Paris N. G. attacked the Tuilleries, and were repulsed by Napoleon Bonaparte with 6000 regular troops. In 1830 they were reorganized under the command of Lafayette, their original chief; and between 1848 and 1851 a law was passed by which all males above 20 not otherwise employed under government were included in the N. G. After the *coup d'état* in Dec. 1851, they were reduced to the condition of an armed police. In the war of 1870-71, they shewed some signs of vitality in sympathy with the Commune, but effected nothing for France. After the fall of the Commune they were disbanded.

**NATIVE**, a term mostly applied to metals, and employed to designate sub-

stances, as minerals, which are most of them more abundantly obtained from other minerals by chemical processes. Thus silver found pure, or nearly so, is called *Native Silver*, whilst most of the silver in use is procured from ores in which it exists variously combined.

**NA'TRON**, or *Troua*, an impure sesquicarbonate of soda ( $2\text{NaO}, \text{HO}, 3\text{CO}_2, + 3\text{Ag}$ ), which always contains sulphate of soda and chloride of sodium. It is obtained from the margins of lakes in Egypt, Siberia, Tibet, &c., and from the borders of the Black and Caspian Seas.

**NATRON LAKES.** Natron was one of the substances employed by the ancient Egyptians in embalming mummies. They called it *hesmen*, and, together with the lakes from whence it was derived, it is mentioned in texts of the 19th dynasty, circa 1900 B.C. These lakes, eight in number, are in the vicinity of Zakeck, a village west of the Damietta branch of the Nile. They are below the level of the sea, and the natron is obtained by evaporation. The locality is also renowned for four monasteries, Deyr Suriiana, St Maiarius, Amba Bishoi, Deyr Baramoos, from whose libraries of Arabic, Coptic, and Syriac MSS. the national collections have been enriched. In the time of St Pachomius, 5000 anchorites dwelt here; they at present number about 300.

Lepsius, "Todd. Taf." vii. c. 17, i. 17; Wilkinson, "Mod. Egypt," i. 383; Brugsch, "Wanderung nach Natron Klöstern" (12mo, Berl. 1855).

**NAT'TERJACK.** See **TOAD**.

**NATUNA ISLANDS.** The, lie to the north-west of Borneo, between  $7^{\circ} 35'$  and  $4^{\circ} 56'$  n. lat., and  $107^{\circ} 57'$  and  $103^{\circ} 15'$  e. long. They are densely wooded and mountainous, Ranay, on Great Natuna, rising to a height of 3500 feet. The largest of the islands is about 600 square miles. Pop. of the whole about 1300, who grow rice, maize, sago, cocoa-nuts, &c., and exchange the produce of their fishings, their sago and cocoa-nut oil, for rice, iron, and cottons, at the European settlements on the Strait of Malacca.

**NATURAL**, in Music, a note belonging to the diatonic scale of C, and neither elevated by a sharp nor depressed by a flat. When a note has been so elevated or depressed, the natural sign  $\natural$  prefixed to it on its recurrence restores it to its place on the scale. When music is written on a key with a signature of sharps or flats, it is the office of the natural sign to counteract the signature as regards the note to which it is prefixed.

**NATURAL HISTORY**, in the widest sense, includes all natural science, and has the whole of creation for its subject. In this sense the term was employed by the philosophers of antiquity. But it is now limited to those branches of science which relate to the crust of the earth and its productions. Of these, geology and mineralogy have for their subject inorganic portions of creation; botany and zoology, the various branches of which are often pursued as separate sciences, with physiology, have for their subject organized creatures. Natural history takes cognizance of the productions of nature, and of their relations to each other, with all the changes on the face of the earth, and all the phenomena of life, both animal and vegetable. It derives assistance from other sciences, particularly chemistry and natural philosophy; and some of the branches of chemistry may also be regarded as branches of natural history. When man himself is considered as a subject of scientific study, psychology must be added to the branches of natural history, but in the term as commonly employed this can scarcely be said to be included.

In every department of natural history, classification is of the utmost importance, and scarcely less important is a scientific nomenclature suited to the classification. The subjects of study are so incalculably numerous, that an arrangement of them in well-defined groups is necessary to any considerable attainment in the knowledge of them; and it is only by systems of classification which arrange smaller groups in larger, and these in larger and larger again, that natural history has been brought to its present state. The very division of natural history into different sciences is a result of such a classification, and implies a recognition of the largest and highest groups. It is not always in the establishment of these groups that the greatest difficulty is experienced. The primary distinction of all the subjects of natural history into organised and unorganised, or into those having life and those

not having life, presents itself very readily to every mind. And equally natural and necessary is the distinction of organised being into Plants and Animals, however difficult it has been found to draw the precise limit between the lowest of plants and the lowest of animals. Another distinction readily presents itself to the student of living beings, in the kinds which retain the same characters from one generation to another. But here arises one of the most important of all the questions of natural history, what a *species* is, and how it differs from a *variety*. For this we refer to the article SPECIES. But much difference of opinion as there is on this point, the common and long-prevalent notion may be assumed, as suitable enough for guidance in all that relates to classification, that those are distinct *species* which cannot by any change of circumstances—or, let it be said, by any *ordinary* change of circumstances, and within any *moderate* period of time—be so modified as to be transmuted one into another, whilst those are only *varieties* of which the modification and transmutation can be thus effected. Thus, in botany, *Brassica oleracea* is a species, of which kale, cabbage, cauliflower, broccoli, Brussels sprouts, &c., are varieties. Species, grouped together, according to their natural affinities, form *genera*; but a *genus* does not necessarily consist of more species than one; for, whilst some contain hundreds of species, others, apparently very distinct, contain only one as yet known to naturalists. The distinctions by which genera are separated are of course arbitrary, and are admitted to be so by those who deny that the distinctions between species are arbitrary, or that there is any uncertainty about them but what arises from the imperfection of our knowledge; for, at present, it must be admitted on all hands, that the uncertainty is in innumerable instances very great, what are species and what are varieties. The great object, however, in the formation of *genera* is that they shall be accordant with the facts of nature; and so in regard to the larger or higher groups which are composed of associated genera, as tribes, families, orders, classes, &c. But in all this, the great difficulty is that affinities exist on many sides; and that groups cannot be satisfactorily arranged in the order of a series, but often rather as if they radiated from a common centre; whilst otherwise viewed, the same groups might seem to radiate very differently from another common centre. A *natural system* is one framed with the utmost possible regard to all these facts; an *artificial system* fixes on one class of facts and proceeds upon it, in disregard of all others. See BOTANY.—In the inorganic departments of nature, a *species* is of course something different from what it is in the organic. But classification still proceeds on the recognition of facts in nature itself, which it is sought to exhibit in the groups that are formed. See MINERALOGY.

The nomenclature of natural history, in so far as it relates to organic beings, continues essentially as it was established by Linnaeus. See GENUS. The names have in many cases been changed, but not the mode of nomenclature.

**NATURAL OBLIGATION**, in Law, means an obligation which is supposed to be prescribed by the law of nature, as the obligation of a parent to maintain his child. In England, such an obligation is not recognised by the common law, and therefore it was necessary in the Poor-Law statutes to punish by a penalty parents who, being able, refused or declined to maintain their children. In Scotland, the natural obligation of a parent to maintain his child is, however, recognised by the common law, though it is also enforced by the Poor-Law statute.

**NATURAL PHILOSOPHY** is a term frequently employed in Great Britain to designate that branch of physical science which has for its subject those properties and phenomena of bodies which are unaccompanied by any essential change in the bodies themselves. It thus includes the various sciences which are classed under *Physics* (q. v.) in the limited sense of that term.

**NATURAL THEOLOGY** is the name given to that branch of moral science which concerns itself with the evidences for the existence of God, drawn from an inquiry into the constitution of the universe. It is believed by the majority of philosophical thinkers, that these evidences warrant the belief in a Being of infinite power, wisdom, benevolence, and justice. There are, however, philosophers of great eminence who deny that there is such a thing as Natural Theology, who say that nature, at the best, gives forth an uncertain sound regarding the existence of a Supreme Being, and that a logical demonstration of such existence is impossible, and has always broken down. This view is held, for example, by atheists like David



Naturalisation  
Nature

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Hume, and the recent Scoto-Oxonian school of metaphysicians, of whom the principal representative is Dean Mansel. The standard English work on the subject has long been Paley's "Natural Theology" (Lond. 1802; new edition by Lord Brougham and Sir Charles Bell, 1836). The Bridgewater and Burnett Treatises are also contributions to this branch of science.

**NATURALISATION**, the act of placing an alien in the position, or investing him with the rights, of a natural-born citizen. The present arrangements with reference to naturalisation, by which the old rule that British allegiance is indelible, has been changed, are embodied in the Naturalisation Act (1870), 33 Vict. c. 14, and the Naturalisation Oath Act (1870), 33 and 34 Vict. c. 102. By the former of these statutes it is provided, that an alien who has resided in the United Kingdom for a term of not less than five years, or has been in the service of the crown for a term of not less than five years, and intends, when naturalised, either to reside in the United Kingdom or to serve under the crown, may apply to one of Her Majesty's Principal Secretaries of State for a certificate of naturalisation. The applicant is bound to adduce such evidence of his residence, or service, and intention to reside, or serve, as shall satisfy the Secretary of State, who may, with or without reason assigned, give or withhold a certificate. No appeal lies from his decision, but his certificate takes no effect until the applicant has taken the oath of allegiance. An alien, to whom a certificate of naturalisation has been granted, is entitled to all political and other rights, powers, and privileges; and subject to all obligations to which a natural-born subject is entitled or subject in the United Kingdom, with this qualification, that he, when within the limits of the foreign state of which he was previously a subject, is not deemed a British subject, unless he has ceased to be a subject of the foreign state by the laws thereof, or by a treaty to that effect. Such a certificate may be granted to any person with respect to whose British nationality a doubt exists; and a grant of such special certificate for the purpose of quieting doubts shall not be deemed an admission that the person to whom it was granted was not previously a British subject. Aliens previously naturalised may, on application, obtain certificates. A British subject who has become an alien, in pursuance of this act (see **ALIEN**), may apply for a certificate of readmission to British nationality on the same conditions as an alien by birth. The Secretary of State has, in this case, the same discretion; and an oath of allegiance is likewise required. The privilege of readmission, like that of admission to British nationality, requires that the recipient shall have ceased to be a subject of the foreign state. In the colonies, the powers of the Secretary of State are conferred on the governor. By the Oaths Naturalisation Act, 33 and 34 Vict. c. 132, any person making or subscribing a false declaration is declared to be guilty of a misdemeanor.

In France, "La grande Naturalisation" confers political privileges; "La petite Naturalisation" gives all the private rights of a French citizen, and it has been doubted whether even public rights are not included in it. In 1867, the term of residence was reduced from ten years to three. A subject of France loses his native character by naturalisation in a foreign country, or acceptance of office abroad without permission of the state, or even by establishing himself permanently out of his country. He may recover his rights by renunciation of his foreign office or domicile.

In Prussia, the higher administrative authorities can naturalise any stranger who satisfies them as to his conduct and means of subsistence. Nomination to a public office confers naturalisation. Prussian nationality is lost—(a) by discharge upon the subject's request; (b) by sentence of the competent authority; (c) by living ten years in a foreign country; (d) by marriage of a female subject with a foreigner.

In Austria, the authorities may confer the rights of citizenship on a person, after ten years' residence within the empire, who has been allowed to exercise a profession. A public functionary becomes thereby invested with rights of citizenship; but admission into the army has not this effect.—In the kingdom of the Netherlands, the power of naturalising rests in the crown.—In Russia, naturalisation is effected by taking an oath of allegiance to the emperor.

In the American States, five years' residence, and a declaration of intention to become a citizen, emitted before a magistrate, is requisite to naturalisation. See "Report of Royal Commissioners on Naturalisation" (1869).

**NATURALISED**. In the language of botanists and zoologists, those plants and animals are said to be *naturalised* in any country, which, having been introduced

into it by man, have established themselves so as to exist without his care. A plant or animal is never said to be naturalised so long as it exists merely in a state of cultivation or domestication, but is so when it becomes truly wild, and, unaided, competes successfully for a place among those which are indigenous to the country. Thus, the horse is not naturalised in Britain, or in most of the countries in which it is most highly valued; but both the horse and the ox may be said to be naturalised in South America. Many of the plants now most characteristic of Southern Europe, are sometimes said to have been originally introduced from the East; and some that are abundant in many parts of Britain were in all probability brought from the continent of Europe. Some of these almost evince their foreign origin by growing chiefly near ruins, or in places which have long been the seats of human habitation. Many plants now naturalised in Britain appear to have been originally brought for medicinal use, although now disregarded. In many cases, however, naturalisation has taken place without any attempt having ever been made by man to introduce the plant even for cultivation; and thus many European weeds are now common in America, the seeds having found their way thither with those of more valuable plants, or in some such accidental manner. The same thing has taken place as to animals. Thus, mice and rats find their way from one country to another; thus the bed-bug found its way at no remote date to Britain; other insects have been even more recently introduced with foreign productions of different kinds; and a mollusc (see *DELISSINA*), previously unknown, has established itself in some British rivers and canals. The pheasant may be mentioned as an instance of naturalisation in Britain, designed and successfully accomplished by man. An *Acclimatisation Society* has recently been formed in London, which has for its object the naturalising, rather than what may more strictly be called the acclimatising, of animals deemed suitable and desirable. It is unquestionable that much may be done by naturalisation of animals, not only to render rural scenes more attractive, but also to increase their economical productiveness. Perhaps nothing of this kind has received so little of the attention due to its importance as the naturalisation of fishes. See *PISCICULTURE*.

**NATURE-PRINTING.** This is a process by which engravings or plates answering thereto are produced by taking impressions of the objects themselves, and printing from them. There is some dispute as to the original inventor of this art; Denmark claims it for a native of Copenhagen, Peter Kyle, a goldsmith, who died about 1833, leaving the MS. description of his invention in the archives of the Royal Collection of Engravings in that capital. It is, however, admitted that no use was made of his invention. In 1853, Alois Auer, director of the State printing establishment of the Austrian empire, published his process, and also some very beautiful works illustrated by this art. About the same time, in this country, Mr G. W. Altkin made known his discovery of an exactly similar process, and shewed some very beautiful plates of feathers, ferns, &c. But whatever other claims may be advanced, it is certain that Alois Auer holds undisputed right to the title of original inventor and practical applier of the invention. The process is very simple as practised by Auer; but it cannot be applied to any objects except those with tolerably flat surfaces, such as dried and pressed plants, embroidery and lace, and a very few animal productions. The object is placed between a plate of copper and another of lead, both worked smooth, and polished; they are drawn through a pair of rollers, under considerable pressure—Mr. Auer says forty to fifty tons; then, when the plates are separated, it is found that a most beautiful and perfect impression of the object has been made in the leaden plate. This may be used directly as an engraved plate, if only a very few impressions are wanted; but as it is too soft to resist the action of the press for practical purposes, a fac-simile of it is obtained in copper by the electrotype process, which is used as the printing-plate. The best practical use to which nature-printing has yet been applied is the multiplication of patterns of lace and other figured surfaces, either in textile materials or metals, for trade purposes. Lace-prints especially are so exactly like the originals, that the most fastidious can require nothing more; hence the cutting up of valuable pieces of lace for patterns has been saved. Henry Bradbury, of the then existing firm of Bradbury and Evans, London, made nature-printing his special study, and produced the exquisite works, "*Nature-printed Ferns*," and "*Nature-printed Sea-Weeds*," in two vols. each (London: Bradbury and Evans).

**Naumachia**  
**Nautilus**

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**NAUMA'CHIA**, a Greek word, signifying literally a naval battle, afterwards, among the Romans, a spectacle which consisted in the imitation of a naval battle. Julius Cæsar was the first to introduce a naumachia into Rome, 46 B.C., causing a portion of the Campus Martius to be dug to form a lake, on which the "spectacle" came off. Augustus made an artificial lake (*stagnum*) near the Tiber for the same purpose, which was afterwards frequently used for naumachiae. Claudius also exhibited a splendid one on Lake Fucinus. Nero, Domitian, and others were likewise fond of such amusements. The combatants were termed *Naumacharii*; they were for the most part either captives or condemned criminals; and the rival fleets took their names from the famous maritime nations of antiquity; Tyrians and Egyptians, Rhodians and Sicilians, Persians and Athenians, Corycæans and Corinthians, Athebians and Syracusans. The magnificence of these spectacles may be estimated from the fact, that in the one exhibited on Lake Fucinus, 19,000 men were engaged. These *naumachiae* were not *sham-fights*, any more than ordinary gladiatorial combats. Both sides fought on in real earnest for dear life until one was utterly overpowered; and as a rule, multitudes were "butchered to make a Roman holiday."

**NAUMBURG**, a town of Prussian Saxony, in the government of Merseburg, situated 17 m. s.-e.-w. of the town of that name, on the Saale, in the midst of a striking amphitheatre of vine-clad hills. Besides its cathedral—a noble Gothic structure, completed in 1249, with two choirs, and containing many beautiful sculptures—there are several other churches. The manufactures are cotton and woollen fabrics, leather, and chemical products. Wine is grown in the vicinity in considerable quantity—11,000 gallons yearly. During the Thirty Years' War, and in the campaigns of 1806 and 1813, N., in which the Prussian magazines were lodged, was a place of great importance. Five annual fairs are held here. Pop. (1875) 16,537.

**NAU'PLIA**, a small fortified town and seaport in the Morea, Greece, at the northern extremity of the Gulf of Argos or Nauplia, and 7 miles south-east of the town of Argos. It is laid out in the manner of a European town. Its roadstead is one of the best in Greece. In the Church of St Spiridion, Capo d'Istria was assassinated in 1831. N. is of high antiquity. At an early period it was the port and arsenal of Argos. In the 13th c., it was occupied by the Venetians, and was taken by the Turks in 1540. From 1824 to 1835, it was the capital of Greece, and had a population of upwards of 12,000; but on the removal of the court to Athens, it fell into decay. Pop. about 4000.

**NAU'SEA** is a distressing sensation always referred to the stomach. It is unattended by pain, but is usually accompanied by a feeling of general languor or debility, a small and often irregular pulse, a pale, cool, and moist skin, general muscular relaxation, an increased flow of saliva, and a sensation that vomiting will supervene. It is most commonly a *direct* symptom of disease or disorder of the stomach, but sometimes it is a very important *indirect* symptom of disease of some part at a distance from the stomach—is, for example, the brain or the kidney. The nausea which is so troublesome to pregnant women is due to the irritation excited by the enlarged uterus being reflected by nervous agency to the stomach.

**NAU'TÆ**, *Canpo'nes*, &c. These words are the commencement of an edict in Roman law, which made shipmasters, innkeepers, and stablers liable for the safety of the goods brought into the ship, inn, or stable. The same doctrine is adopted by the common law of England and Scotland, subject to variations produced by the Carriers' Act, and Railway and Canal Traffic Act, so far as regards carriers and railway and canal companies.

**NAU'TICAL ALMANAC**, a work projected for the special behoof of astronomers and navigators. See **ALMANAC**. It is chiefly valuable to the latter class from its containing tables of the "lunar distances"—i. e., distances of the moon from a few (5 to 7) of the more prominent stars, given for every three hours throughout the year—by which, at the present day, longitudes (see **LATITUDE** and **LONGITUDE**) are most conveniently and accurately determined. To the astronomer, the "Nautical Almanac" furnishes a great mass of important data; it gives the position of the moon in right ascension and declination for every hour, and the sun's latitude and longitude for every day in the year; it shews the obliquity of the ecliptic, the sun's

and moon's parallax, aberration, &c., at different times; it supplies the necessary data for the determination of the real or apparent size, position, and motion of the planets and their satellites; it fixes accurately the places of about 150 fixed stars, and gives full details concerning eclipses, occultations, transits, and other celestial phenomena occurring during the year. It is generally issued four years in advance, for the sake of mariners going on long voyages.

**NAUTILUS**, a genus of *tetrabranchiate Cephalopoda* (q. v.), extremely interesting as the existing representatives of an order of molluscs now reduced to a very few species, but of which the fossil remains attest the great abundance in former geological periods. The species of this genus are found only in the seas of warm climates. One or more of them must have been known to Aristotle, as appears from his description, which, however, is not minute. Yet it is but recently that they came under the observation of modern naturalists; and they were very imperfectly known, till a specimen, obtained by Dr Bennett in a bay of the New Hebrides in 1833, was submitted to the examination of Professor Owen, and became the subject of a valuable memoir by him. The shell, indeed, has long been common enough in collections, being plentifully found, entire or in fragments, on many tropical shores; but from the shell alone, little could be learned concerning the animal to which it belonged. The shell is spiral, the spire not at all elevated; and thus, in external form, resembles the shells of many species of snail; but internally, it is *camerated*, or divided into chambers, by transverse curved partitions of shelly matter. In a very young state, this structure does not exist; but as the animal increases in size, it deserts its first habitation, which then becomes an empty chamber, and so proceeds from one to another still larger, occupying the outermost only, but retaining a connection with all by means of a membranous tube (*siphuncle*) which passes through the centre of each partition. The use of this connection is not known; but the most probable supposition is, that the animal is enabled, by throwing air or some kind of gas into the empty chambers of the shell, or by exhausting them of air, to change the total weight, so that it may rise or sink in the water at pleasure. It commonly inhabits the bottom of the sea, where it creeps about, probably like the gastropods, by means of a large muscular disc with which the head is furnished; but it sometimes rises to the surface, and is to be seen floating there. Dr Bennett states that the specimen which he fortunately captured, attracted his attention when thus floating, as an object resembling a dead tortoise-shell cat. The story of its spreading a sail is as fabulous as the similar story regarding the argonaut. The head and arms can be protruded from the shell, and can also be completely retracted within it. There are numerous arms attached to the head, nineteen in the best known species; there are also numerous other tentacles; but none of these organs are furnished with suckers, and they are feeble in comparison with the corresponding organs of many of the higher or dibranchiate cephalopods. The mouth is of the parrot's bill form, as in the other cephalopods; but the mandibles are not entirely composed of horny matter, their extremities being calcareous and of a hardness apparently adapted for breaking shells. Their edges are also notched, and show an adaptation for crushing rather than for cutting. The tongue is large. The gizzard is muscular. The food appears to consist, at least in great part, of crustaceans.

Only three species of *N.* are known, of which the best known and apparently the most abundant, is the **PEARLY N.** (*N. pompilius*), which is found in the Indian and the Pacific Oceans. Its shell is beautifully nacreous within; and is externally porcelaneous-like, white, and streaked with reddish chestnut. The shell, being large, thick, and strong, is used for a variety of purposes by the natives of the East Indies and South Sea Islands; it is also made into ornaments of various kinds in China and elsewhere. The animal is eaten by the Fijians and other South Sea islanders, and is much esteemed as an article of food. The Fijians capture it by means of a basket-trap, somewhat like those used for catching lobsters, baited with boiled crayfish. The name **PAPER N.** has sometimes been given to the Argonaut (q. v.)

**Fossil Nautilus.**—About one hundred and fifty species of fossil shells have been referred to this genus. They occur in all the strata from the Upper Silurian to the most recent deposits. Numerous forms, however, which exhibit very wide differences, have been incongruously associated under this generic name. The palæozoic nautili are so remarkable, that they must certainly be referred to one or more separ-

ate genera: some of the carboniferous species have a square back, and the whorls either compact or open in the centre, while the last chamber is more or less disunited from the shell; and the Devonian *Clymenia* has angular sutures and an internal siphuncle. Until a careful revision of this section of the Cephalopoda is made, it will be better to consider the species as belonging to the family *Nautilidae*, and not to the genus *Nautilus*.

NAUTILUS PROPELLER was long the best known among many names given to a mode of propelling steam-vessels by means of a horizontal wheel within board. Instead of a paddle or a screw on the outside. *Hydraulic* propeller has latterly come more into use. Engineers thought of this mode of propulsion generations ago, and patents have been taken out for inventions relating to it by Toogood, Hayes, Rumsey, Linaker, Hall, and others; but the most successful attempts to realise it have been those of Mr Ruthven. He constructed a small boat, 9 feet long, in 1839 (tried on the Union Canal), and a vessel 40 feet long, in 1844 (tried on the Forth), to test the principle; each was worked by a small steam-engine, and provided with the hydraulic apparatus. In 1849, Mr Ruthven made improvements in the apparatus, and introduced them in a vessel, 30 feet long, tried upon the Thames. In 1851, he placed a boat in the Great Exhibition. In 1853, a vessel on this principle, called the *Albert*, was built in Prussia by M. Sydel, the machinery being supplied by Mr Ruthven. She plied on the Oder as a passenger-steamer for many years, and illustrated favorably some of the characteristic features of the nautilus system. The term of Mr Ruthven's patent expired, however, before the invention had worked its way into use in England; and the Privy Council, in 1863, gave a further term of ten years. He afterwards began building a vessel to be called the *Nautilus*; while the Admiralty authorised the commencement of the gun-vessel *Waterwitch*, both to be worked on the Ruthven principle.

The *Nautilus* was first tried on the Thames in April 1866. It is fitted with two steam-engines of 10 (nominal) horse-power each, with cylinders of 17 inches diameter, and 2 feet stroke. Water is admitted through apertures in the bottom of the vessel into a water-tight iron case or compartment. In this case is placed a horizontal so-called turbine-wheel, 7 feet in diameter, acted on from a vertical shaft connected with the steam-cylinders. The wheel is divided in compartments by plates or radii of peculiar curvature, and is placed below the water-line of the vessel, so as to be always immersed. Two pipes extend from the wheel-case, one to either side of the vessel, where they emerge nearly at midship. Each pipe terminates with nozzles, 10 inches in diameter, placed outside the vessel at right angles to the pipes; inasmuch that each side of the vessel has a nozzle pointing ahead and another pointing astern. A valve is fitted to each pipe, at its junction with the nozzles, to open the passage to one nozzle and close it against the other; and the movement both of the starboard and the port valves can be governed from a raised deck built over the engine-house. The wheel-case is always full, or nearly full of water, which enters through the apertures in the bottom of the vessel. When the wheel is made to rotate horizontally by the steam-engines, water is drawn in through the hollow axis, and expelled at the periphery by centrifugal force; it can only find an outlet through the two pipes, and then through the nozzles which terminate them. Supposing the nozzles pointing astern to be open, and those pointing ahead to be closed, the vessel is propelled forward by the resistance of the water of the river or sea to that rushing out of the nozzles; when the forward nozzles are open, and the hinder ones closed, the vessel is propelled backwards or driven astern. The captain, standing on the raised deck and commanding both valves, can close the fore-nozzles and open the aft, which makes the vessel go ahead; he can open the fore and close the aft, which makes her go astern; he can open one fore nozzle and close the other, which makes her turn. The exit of the water from the nozzles is a little above sea-level, a plan found to be better than actually immersing them. In one of the trial-trips of the *Nautilus*, with strong wind and tide urging her on, and going at full speed, she was stopped dead in less than 10 seconds, and in about a quarter of her length, by simply reversing the valves.

The performance of the *Nautilus* was satisfactory enough to lead the Admiralty to expedite the finishing of the *Waterwitch*, an iron-clad gun-vessel of 778 tons and 160 horse-power. The wheel is rotated by an engine having three separate cylinders, each  $33\frac{1}{2}$  inches diameter by 3 feet 6 inches stroke. The vessel was built at

the Thames iron-works, and engined by Messrs J. and W. Dudgeon of Blackwall. Its turbine-wheel is 14 feet in diameter; it rotates (at full engine-power) 39 times per minute. The brass discharge-nozzles, which measure 24 inches by 19½, are continued along the outside of the vessel 8 feet on each side of the centre; the lower lips of the discharge-nozzles are 8 inches below water-line, the remainder of the aperture being above water. The *Waterwitch* is flat-bottomed and double-ended, i. e., she has a rudder at each end, so that she can steer equally well when going ahead or astern. Her total cost was £60,000, of which no less than £13,600 was for the engines.

As regards her speed and the efficiency of her machinery, the *Waterwitch* did not do all that was expected of her; she was neither more nor less successful than her sister ships, the *Viper* and *Vixen*, and they all three belonged to the slowest class of gun-boats. As her machinery was much more expensive than that of the others, nothing has as yet been done in the way of adding to the number of hydraulic engines in the navy. They possess many advantages in regard to manœuvring the ship, but these are to a great extent also possessed by twin-screw engines, which can be made at a less cost; while some of the advantages originally claimed for them, such as freedom from ship, have not been realised in actual work. In such exceptional vessels as those of the *Viper* class, a fair comparison of the merits of the hydraulic propeller with those in common use cannot be made. The net result of the experiments hitherto made is, that while the addition of one additional part to the machinery between the engines and the actual propellers (which in this case are the columns of water) is open to grave objections; still, with a "turbine" less faulty in design, and under more favorable circumstances as regards the vessel in which it is placed, the hydraulic propeller may be found useful in men-of-war. The *Waterwitch* has chiefly been employed in harbor work as a tender to larger vessels.

**NAUVOO'**, a town in Illinois, United States of America, on the east bank of the Mississippi River, 220 miles above St. Louis. It was built by the Mormons in 1840, and in 1846 contained a population of 15,000. Its principal feature was a great temple of polished marble, original in style, and imposing in appearance. After the murder of Joseph Smith, the Mormon prophet (see **MORMONS**), and the expulsion of his followers, the temple was burned. The town was afterwards bought and occupied by a French Socialist community, under the leadership of M. Cabet. This experiment having proved, like others, a failure, the once famous city has been reduced to an inconsiderable village.

**NAVAL ARCHITECTURE.** See **SHIP-BUILDING**.

**NAVAL CADETS** are the youths training for service as naval officers. Every admiral on hoisting his flag may nominate two, every captain one cadet. The boy must be between 12 and 13½ years old. He is examined at the Royal Naval College at Greenwich, and if he passes, is sent for two years to the *Britannia* training-ship, at Dartmouth. At the end of that time, if he has progressed satisfactorily, he is put into a sea-going ship, and becomes a midshipman at once if he has gained a first-class certificate.

**NAVAL CROWN**, in Heraldry, a rim of gold round which are placed alternately paws of galleys and square sails. The device is said to have originated with the Roman emperor Claudius, who, after the conquest of Britain, instituted it as a reward for maritime services. He who first boarded the enemy's ship, and was the occasion of its being captured, was entitled to a naval crown. A naval crown supporting the crest in place of a wreath, occurs in various grants of arms in the early part of the present century, to the naval heroes of the late war. The crest of the Earl of St Vincent, bestowed on him after his victory over the Spanish fleet in 1797, is issuing out of a naval crown or, enveloped by a wreath of laurel vert, a demipegasus argent maned and hooped of the first and winged azure, charged in the wing with a fleur-de-lis or.

**NAVAL RESERVE**, Royal, is a sort of militia auxiliary to the royal navy. It is a force held in high esteem by naval men; and is considered an extremely valuable reserve of trained men ready to man the fleet in case of emergency. The force was instituted in 1859, under the Act 22 and 23 Vict. c. 40. That act authorizes the engagement of 30,000 men, each for a period of five

years, and provides that each shall be trained, for 28 days in every year, to the use of arms and naval tactics, either in Her Majesty's ships or on shore. In case of national emergency, these men can, by royal proclamation, be called out for service in the navy in any part of the world, for periods not exceeding five years. While training and while called out for actual service, the men receive the same wages as corresponding ratings in the royal navy; in addition, they each receive, as retaining fee, a sum of six pounds for every year in which the regulated training has been completed. On actual service, after three years—whether of uninterrupted service, or at broken intervals—the volunteer becomes entitled to twopence extra per diem. The man can terminate his engagement at the end of five years, unless on actual service, when the Queen may require him to complete five years of such service before discharging him. During the continuance of his engagement, he must not embark on voyages which shall entail a longer absence from the United Kingdom than six months, unless with special permission of the Admiralty. The periods for training are made as far as practicable to suit the sailor's convenience: he may break the 28 days into shorter periods, none being less than seven days. He is drilled as near as practicable to his own home, the drilling being intrusted to the officers of the Coast-guard. While drilling, if on board a Queen's ship, he has the regulation victuals; if billeted on shore, while training for great-gun exercise in batteries, he is allowed 1s. 4d. a day for victuals. It is optional with the volunteer to renew his engagement from time to time, as the respective periods of five years expire; and at about the age of 45, he becomes entitled to a pension of £12 or upwards for the rest of his life, subject to the usual obligation of service in certain circumstances in the navy, which all pensioners are under. This pension may be commuted, if desired, into one of less amount, to last until the death of the longest liver of the volunteer and his wife.

To be eligible for the Royal Navy Reserve, a man must be a British subject, under 35 years of age, in good health, and, within the preceding ten years, must have served at least five years at sea, of which one year shall have been as able seaman. Soldiers, militiamen, and Coast Volunteers are ineligible, and subject to a penalty if they join; but a member of the last force may obtain his discharge therefrom for the purpose of joining the Naval Reserve. Penalties are enacted in case men fail to attend: and failure after proper notice to come up for actual service is held equivalent to desertion. While training or on duty, the men are liable to all the punishments, as they are entitled to all the rights and privileges of regular seamen. The men considered most desirable are (1) those having fixed residences, and personally known to the shipping-master or his deputies; and (2) men having regular employment in the coasting-trade, or in vessels the business of which brings them back to the same ports at frequent and known intervals. In 1877, about 20,000 men belonged to the Naval Reserve, and were in a state of great efficiency.

In 1861, the system of the Reserve was extended—by the Act 24 and 25 Vict. c. 129—to officers of the merchant-service, certificated masters and mates being respectively granted commissions in the Naval Reserve as lieutenants and sub-lieutenants. The holders are required to train for 28 days annually on board Her Majesty's ships, and are liable to be called out for actual service when required. When training, or on actual service, lieutenants receive 10s. and sub-lieutenants 7s. a day, with all the privileges, pensions for wounds, pensions to widows, uniforms, &c., of naval officers of corresponding rank. The number of these officers allowed by regulation is 130 lieutenants, and 270 sub-lieutenants: of these, in 1874, commissions had been granted to 117 lieutenants, 78 sub-lieutenants, and 2 engineers. The total cost of the Naval Reserve, officers and men, for the year 1876–1877, was estimated at £2,0,109.

NA'VAN, a market town of Meath County, Ireland, situated at the junction of the Boyne and Blackwater, 28 n.-w. of Dublin, with which city it is connected by two railways. Pop. (1871) 4104, of whom 3868 were Catholics, 203 Episcopal-Protestants, and the rest Protestants of other denominations. N. is one of the most ancient boroughs in Ireland, and returned two members to the Irish parliament. It possesses considerable inland trade, a flax-mill, several flour-mills, and two paper-mills, besides a tannery, a brewery, and two distilleries. There are also an endowed school, a Roman Catholic seminary (one of the first opened in Ireland after the re-

peal of the penal law), and four national schools, containing (1871) 1304 pupils, of whom 609 were boys, and 605 girls. The two girls' schools are attached to the Roman Catholic convent. Several interesting remains, both Celtic and Norman-English, are found in N. and the vicinity.

NAVARINO, or Neo-Castro, a seaport and citadel on the south-west coast of the Morea in Greece, contains only 2000 inhabitants, but is of importance from its position, commanding the entrance of the Bay of Navarino, at the southern extremity of which it is situated. On the island of Sphaghi or Sphacteria, which closes the bay's mouth, was formerly situated Pylos Messeniac, the town of Nestor, in a spot where now stands Old Navarino or Paleocastro. The Bay of Navarino was the scene of a great sea-fight between the Athenians under Cleon, and the Spartans (425 B.C.), in which the latter were defeated; and on the 20th October 1827, it saw the annihilation of the Turkish and Egyptian navies by the combined British, French, and Russian fleets under Sir Edward Codrington.

NAVARRRE, a province, and formerly a kingdom of Spain, is bounded on the n. by France, on the s. and e. by Aragon, and on the w. by the Biscays; and is situated in 42° 20'—43° 15' n. lat., and 0° 50'—2° 30' w. long. Area about 4000 square miles. Pop. (1870) 313,687. The country is mountainous, being bounded and traversed by the Pyrenees, spurs of which occupy almost the whole of the province in its northern and eastern parts. The highest peaks are Altoviscar, Adi, Alcorrunz, and Rofia. N. is watered by the Bidassoa, the Anezoa, and by the Ebro, together with its tributaries, the Ega and Aragon, on the level shores of which corn, wine, and oil of good quality are produced. Some of the valleys which intersect the mountain-ranges, as those of Roncesvalles, Lescon, Bastau, and Roncal, have a fruitful soil, and yield good crops; but in the mountain districts, husbandry is impracticable, and the inhabitants nearly all follow the chase, as much from necessity as inclination; and while a large number of the Navarrese are soldiers, a still larger proportion are smugglers—the proximity of the province to France, and the dangerous character of the almost inaccessible mountain passes which alone connect the two countries, holding out many inducements and facilities in the way of smuggling. The mountain forests still harbor bears, wolves, wild-cats, goats, deer, and an abundance of game of every other kind. Iron and salt are the chief mineral products of the district, but these are obtained in sufficient quantities to be exported. The people of N. are a hardy, brave, and hospitable race, loyal to the sovereign, attentive observers of the forms of their religion, and, except in the matter of smuggling, honest and moral; but they are passionate and distrustful, prone to anger, and keen in avenging an insult, real or imaginary. Although not industrious, the people follow a few branches of industry, and manufacture glass, leather, soap, chocolate, &c., of good quality.

The Navarrese, with few exceptions, are members of the church of Rome, to whose tenets they cling with superstitious devotion. They have always intermarried chiefly among their own compatriots, and are a nearly pure Basque race. In the mountainous districts, Basque is still spoken, but in the plains, the modern Castilian form of Spanish is rapidly supplanting the ancient language of the country. The chief town is Pamplona (q. v.).

The territory known from an early period of Spanish history under the name of N., was occupied in ancient times by the Vascones, who were subdued by the Goths in the 5th century. After having become gradually amalgamated with their conquerors, the people continued to enjoy a species of turbulent independence under military leaders until the 8th c., when they were almost annihilated by the hordes of Arabs who were rapidly spreading their dominion to all parts of the peninsula. The Gothic Vascones of N., who had been converted to Christianity, offered a gallant resistance to their infidel invaders, and although repeatedly beaten, they were not wholly subdued. The remnant which escaped the sword of their Moslem enemies took refuge in the fastnesses of the mountains, and choosing a knight of their number, Garcia, Ximenes, as their leader or king, they sallied forth, and by their gallant resistance, compelled the Arabs to leave them in the enjoyment of an independence greater than that of the neighboring states. On the extinction of the race of Ximenes, in the middle of the 9th c., the Navarrese elected as their king Iulgo Sanchez, Count of Bigorre, in whose family the succession remained till the marriage of Philip the Fair with Queen Joanna I. of N.; and the accession of the former



to the throne of France in 1285, rendered N. an appanage of the crown of France. It continued a part of that kingdom during the successive reigns of Louis X., Philip V., and Charles the Fair; but on the death of this last in 1328, France fell to the family of Valois, and the daughter of Louis X., the rightful heir, succeeded to N. as Joanna II. The events of the kingdom present no features of interest during the next hundred years. The marriage of Blanche, daughter of Charles III. of N., with John II. of Aragon, in 1442, did not produce an annexation of N. to Aragon, as John suffered his wife to rule her own kingdom as she pleased, and even after her death and his subsequent re-marriage, he resigned the government entirely to his son by Blanche. This son, known as Charles, Prince of Viano, having attempted to remain neutral in his father's quarrels with Castile, John expelled him and his elder sister Blanche, who sided with him, from N., and conferred the kingdom on Leonora Comtess de Foix, his younger daughter, by Blanche, whose misrule completed the disorganisation which these family quarrels had commenced. Her son, Francis, called Phebus, from his beauty, succeeded in 1479, and his sister Catherine in 1483. Ferdinand and Isabella sought to marry the young queen to their son and heir, the Prince of Asturias, but her mother, a French princess, married her to Jean d'Albret. Ferdinand, however, was not willing to let the prize escape him, and on some slight pretext he seized N. in 1512. After this act of spoliation, there remained nothing of ancient N. beyond a small territory on the northern side of the Pyrenees, which was subsequently united to the crown of France by Henri IV. of Bourbon, King of N., whose mother, Jeanne d'Albret, was granddaughter of Queen Catherine; and hence the history of N. ends with his accession to the French throne in 1589. The Navarrese were, however, permitted to retain many of their ancient privileges, after their incorporation with the other domains of the Spanish crown, until the reign of Queen Isabella II., when the active aid which they furnished to the pretender, Don Carlos, in the rebellion of 1834-1839, led to the abrogation of their *fueros*, or national assemblies, and to the amalgamation of their nationality with that of the kingdom at large. In the later Carlist struggle of 1872-1876, N. was again a principal seat of the war, the inhabitants being stimulated in their assistance of the representative of the claims and title of Don Carlos by his promise of restoring their *fueros*.

NAVE. See CHURCH.

NA'VEW (Fr. *navette*), a garden vegetable much cultivated in France and other parts of the continent of Europe, although little used in Britain. It is by some botanists regarded as a cultivated variety of *Brassica napus*, or Rape (q. v.), whilst others refer it to *B. campestris*, sometimes called Wild N., the species which is also supposed to be the original of the Swedish Turnip (q. v.). The part used is the swollen root, which is rather like a carrot in shape. Its color is white. Its flavor is much stronger than that of the turnip. It succeeds best in a dry light soil. The seed is sown in spring, and the plants thinned out to 5 inches apart.

NAVICULA (Lat. a little ship), a genus of *Diatomaceæ* (q. v.), receiving its name from the resemblance of its form to that of a boat. Some of the species are very common.

NAVICULAR DISEASE, in the Horse, consists in strain of the strong flexor tendon of the foot, at the point within the hollow of the fetlock, where it passes over the navicular bone. It is most common amongst the lighter sorts of horses, and especially where they have upright pasterns, out-turned toes, and early severe work on hard roads. It soon gives rise to a short tripping yet cautious gait, undue wear of the toe of the shoe, wasting of the muscles of the shoulder, and projecting or "pointing" of the affected limb whilst standing. When early noticed, and in horses with well-formed legs, it is often curable; but when of several weeks' standing, it leads to so much inflammation and destruction of the tendon and adjoining parts, that soundness and fitness for fast work are again impossible. Rest should at once be given, the shoe removed, the toe shortened, and the foot placed in a large, soft, hot poultice, changed every few hours. Laxative medicine and bran mashes should be ordered, and a soft bed made with old short litter. After a few days, and when the heat and tenderness abate, cold applications should supersede the hot; and, after another week, a blister may be applied round the coronet, and the animal placed for two months in a good yard or in a grass field, if the ground be soft and moist: or,

if sufficiently strong, at slow farm-work on soft land. Division of the nerve going to the foot removes sensation, and consequently lameness; and hence is useful in relieving animals intended for breeding purposes or for slow work. The operation, however, is not to be recommended where fast work is required; for the animal, insensible to pain, uses the limb as if nothing were amiss, and the disease rapidly becomes worse.

**NAVIES, Ancient and Medieval.** The ancient method of naval warfare consisted, in great part, in the driving of *beaked* vessels against each other; and therefore skill and celerity in manœuvring, so as to strike the enemy at the greatest disadvantage, were of the utmost importance. The victory thus usually remained with the best sailor. This mode of conflict has been attempted to be revived at the present time, and vessels called "steam-rams" are specially constructed for this species of conflict. The earliest powers having efficient fleets appear to have been the Phœnicians, Carthaginians, Persians, and Greeks; the Greeks had fleets as early as the beginning of the 7th c. B.C.—the first sea-fight on record being that between the Corinthians and their colonists of Corcyra, 664 B.C. The earliest great battle in which tactics appear to have distinctly been opposed to superior force, and with success, was that of Salamis (480 B.C.), where Themistocles, taking advantage of the narrows, forced the Persian fleet of Xerxes to combat in such a manner, that their line of battle but little exceeded in length the line of the much inferior Athenian fleet. The Peloponnesian War, where "Greek met Greek," tended much to develop the art of naval warfare. But the destruction of the Athenian marine power in the Syracusan expedition of 414 B.C. left Carthage mistress of the Mediterranean. The Roman power, however, gradually asserted itself, and after two centuries, became omnipotent by the destruction of Carthage. For several following centuries the only sea-fights were occasioned by the civil wars of the Romans. Towards the close of the empire, the system of fighting with pointed prows had been discontinued in favor of that which had always co-existed—viz., the running alongside and boarding by armed men, with whom each vessel was overloaded. Oars, balistæ, &c., were ultimately carried in the ships and used as artillery; but they were little relied on, and it was usual, after a discharge of arrows and javelins, to come to close quarters. A sea-fight was therefore a hand-to-hand struggle on a floating base, in which the vanquished were almost certainly drowned or slain.

The northern invaders of the empire, and subsequently the Moors, seem to have introduced swift-sailing galleys, warring in small squadrons and singly, and ravaging all civilised coasts for plunder and slaves. This—the break-up of the empire—was the era of piracy, when every nation, which had more to win than lose by freebooting, sent out its cruisers. Foremost for daring and seamanship were the Norsemen, who penetrated in every direction from the Bosphorus to Newfoundland. Combination being the only security against these marauders, the medieval navies gradually sprang up; the most conspicuous being—in the Mediterranean, those of Venice, Genoa, Pisa, Aragon; on the Atlantic sea-board, England and France. In the Mediterranean, Venice, after a long struggle with the Genoese, and subsequently with the Turks, became the great naval power. The Aragonese fleet gradually developed into the Spanish navy, which, by the epoch of Columbus, had a rival in that of Portugal. Many struggles left, in the 16th and 17th centuries, the principal naval power in the hands of the English, French, Dutch, Spaniards, and Portuguese. The present state of these and other existing navies will be briefly given under **NAVIES, MODERN.**

**NAVIES, Modern.** Dating the modern navies of the world from the 16th c., we find the British navy rising from insignificance by the destruction of the Spanish Armada in 1588; a blow which Spain never recovered, and which the Dutch, whose naval force had acquired tremendous strength in their struggle for independence, increased the weight of, by their triumph in 1607, in the Bay of Gibraltar. At this time, there was no decisive superiority of the fleet of England over that of France; but each was inferior to the Dutch navy. The Commonwealth and reign of Charles II. were signalled by the struggle for mastery between the English and Dutch; when victory, after many alternations, finally sided with the former. Through the 18th c., the English and French were the principal fleets; but Louis XVI. gave a decided superiority to the navy of France; and at the period of the American War,

the naval power of England was seriously threatened. Spain, Holland, and Russia (now for the first time a naval power) had meanwhile acquired considerable fleets; and the "armed neutrality," to which the northern powers gave their adherence, rendered the British position most critical. However, the slowly roused energy of her government, the invincible courage of her seamen, and the genius of her admirals, brought Britain through all her trials. Camperdown broke the Dutch power; many battles weakened the French navy; and at Trafalgar, in 1805, it, with the Spanish power, was swept from the ocean. The United States had in the meantime augmented their fleet, and in the war of 1812—1814, maintained a glorious struggle. During the American War of Secession, many gun-boats, "monitors," and iron-clads of all classes, were created; but chiefly adapted for river and coast service. The growth, in recent times, of the British navy will be found under **NAVY, BRITISH**. The Emperor Napoleon III. greatly enlarged and improved the French navy, yet in the war of 1870—1871 it had no opportunity of proving its effectiveness.

The contest between the attack and defence which has been going on for some time appears to have attained its limits in the 100-ton guns of the Italian navy, and the 24-inch armor plate of the British; and a new departure seems already to have been taken which points in the direction of steel-plates and speed, and a more special adaptation of ships for particular services. The torpedo system has introduced a new element into naval warfare, particularly in harbors, rivers, and inland waters, which can hardly be said to be yet fully developed (see **TORPEDO**); and the catastrophe of the *Vanguard* of the British navy, and the *Grosser Kurfürst* of the German, have pointed out dangers connected with the ram system that had not been calculated upon.

The following table gives a fair estimate of the comparative strength of the chief navies of the world. Comparison by the number of guns is of little account now; that of *armored steamers* and *horse-power* is more to the point:

CHIEF NAVIES OF THE WORLD, 1877.

COUNTRY.	Armored Steamers.	Unarmored Steamers.	Sailing Vessels.	Total Ships.	Horse- Power.	Guns.	Men.	Annual Cost.
Austria-Hungary ...	11	37	10	58	16,206	324	9,970	£941,019
Brazil.....	11	48	8	60	12,027	197	5,097	1,133,000
Denmark.....	7	21	....	28	....	....	2,964	272,100
France.....	53	326	113	492	250,324	2834	71,154	7,439,000
Germany.....	20	36	4	60	103,300	407	7,435	1,428,850
Great Britain.....	65	360	125	543	*297,700	*770	*81,400	11,091,392
Greece.....	2	6	6	14	....	....	658	75,525
Italy.....	16	70	....	86	41,216	676	16,036	1,826,245
Netherlands.....	17	68	20	105	....	470	9,246	1,126,049
Portugal.....	1	26	12	39	4,255	180	3,393	287,563
Russia.....	29	194	....	223	81,080	548	29,643	3,589,431
Spain.....	10	71	8	89	23,267	922	15,649	1,029,600
Sweden and Norway	18	53	180	265	8,268	567	....	424,166
Turkey.....	33	45	....	78	....	....	24,000	3,000,000
United States.....	24	70	22	116	....	1298	8,287	2,848,820

**NAVIGATION, History of.** In its widest sense, this subject is divisible into three sections—the history of the progressive improvement in the construction of ships, the history of the growth of naval powers, and the history of the gradual

\* The horse-power and guns of the armored steamers only are given. The number of men includes the Royal Naval Reserve.

spread and increase of the science of navigation. Although these three sections are to some extent interwoven, the present article will be limited to a consideration of the last, the first two being sufficiently described under SHIP-BUILDING, and NAVIES.

The first use of ships, as distinguished from boats, appears to have been by the early Egyptians, who are believed to have reached the western coast of India, besides navigating the Mediterranean. Little, however, is known of their prowess on the waves; and, whatever it may have been, they were soon eclipsed by the citizens of Tyre, who, to make amends for the unproductiveness of their strip of territory, laid the seas under tribute, and made their city the great emporium of Eastern and European trade. They spread their merchant fleets throughout the Mediterranean, navigated Solomon's squadrons to the Persian Gulf and Indian Ocean, and planted colonies everywhere. Principal among these colonies was Carthage, which soon outshone the parent state in its maritime daring. The Carthaginian fleets passed the Pillars of Hercules, and, with no better guide than the stars, are believed to have spread northward to the British Isles, and southward for some distance along the west coast of Africa. From the 6th to the 4th centuries B.C., the Greek states gradually developed the art of navigation, and at the time of the Peloponnesian war the Athenians appear to have been skilful tacticians, capable of concerted manœuvres. The Greeks, however, were rather warlike than commercial in their nautical affairs. In the 4th c. B.C., Alexander destroyed the Tyrian power, transferring its commerce to Alexandria, which, having an admirable harbor, became the centre of trade for the ancient world, and far surpassed in the magnitude of its marine transactions any city which had yet existed. Rome next wrested from Carthage its naval power, and took its vast trade into the hands of the Italian sailors. After the battle of Actium, Egypt became a Roman province, and Augustus was master of the enormous commerce both of the Roman and the Alexandrian merchants. During all this period, the size of the vessels had been continually increasing, but probably the form was that of the galley, still common in the Mediterranean, though a more clumsy craft than now. Sails were known, and some knowledge was evinced even of beating up against a foul wind; but oars were the great motive-power; speed was not thought of, a voyage from the Levant to Italy being the work of a season; and so little confidence had the sailors in their skill or in the stability of their ships (still steered by two oars projecting from the stern), that it was customary to haul the vessels up on shore when winter set in. During the empire, no great progress seems to have been made, except in the size of the vessels; but regular fleets were maintained, both in the Mediterranean and on the coast of Gaul, for the protection of commerce. Meanwhile the barbarian nations of the north were advancing in quite a different school. The Saxon, Jutish, and Norse prows began to roam the ocean in every direction; in small vessels, they trusted more to the winds than to oars, and, sailing singly, gradually acquired that hardihood and daring which ultimately rendered them masters of the sea. The Britons were no mean seamen, and when Carausius assumed the purple in their island, he was able, for several years, by his fleets alone, to maintain his independence against all the power of Rome.

The art of navigation became almost extinct in the Mediterranean with the fall of the empire; but the barbarous conquerors soon perceived its value, and revived its practice with the addition of new inventions suggested by their own energy. The islanders of Venice, the Genoese, and the Pisans, were the carriers of that great inland sea. Their merchants traded to the furthest Indies, and their markets became the exchanges for the produce of the world. Vast fleets of merchant galleys from these flourishing republics dared the storm, while their constant rivalries gave occasion for the growth of naval tactics. So rich a commerce tempted piracy, and the Moorish corsairs penetrated everywhere on both sides of the straits of Gibraltar in quest of prey; evincing not less skill and nautical audacity than savage fury and inhuman cruelty. But the Atlantic powers, taught in stormy seas, were rearing a naval might that should outlive all other pretenders. The Norsemen extended their voyages to Iceland, Greenland, and Newfoundland, while they first ravaged and then colonised the coasts of Britain, France, and Sicily. The sea had no terrors for these hardy rovers; their exploits are imperishably recorded in the

Icelandic Sagas, and in the numerous islands and promontories to which they have given names.

Early in the 15th c., the introduction of the mariner's compass rendered the seaman independent of sun and stars—an incalculable gain, as was soon shewn in the ocean-voyages of Columbus, Cabot, and others. In 1492, Columbus rendered navigation more secure by the discovery of the variation of the compass. Between that and 1514, the "cross-staff" began to be used; a rude instrument for ascertaining the angle between the moon and a fixed star, with the consequent longitude. Early in the 16th c., tables of declination and ascension became common. In 1537, Nuffez (Nonius), a Portuguese, invented various methods of computing the rhumb-lines and sailing on the great circle. In 1545, the two first treatises on systematic navigation appeared in Spain, one by Pedro de Medina, the other by Martín Cortes. These works were speedily translated into French, Dutch, English, &c., and for many years served as the text-books of practical navigation. Towards the end of the century, Bourne, in England, and Stevin in Holland, improved the astronomical portion of the art, while the introduction of time-pieces and the Log (q. v.) rendered the computation of distance more easy.

It would be tedious to enumerate the successive improvements by which the science of navigation has been brought to its present high perfection; but as conspicuous points in the history of the art, the following stand out: The invention of Mercator's chart in 1569; the formation by Wright of tables of meridional parts, 1597; Davis's quadrant, about 1600; the application of logarithms to nautical calculations, 1620, by Edmund Gunter; the introduction of middle-latitude sailing in 1623; the measure of a degree on the meridian, by Richard Norwood, in 1631. Hadley's quadrant, a century later, rendered observations easier and more accurate; while Harrison's chronometers (1764), rendered the computation of longitude a matter of comparatively small difficulty. Wright, Boud and Norwood were the authors of scientific navigation, and their science is now made available in practice by means of the "Nautical Almanac," published annually by the British Admiralty. The more important points of the science of navigation are noticed under such heads as DEAD-RECKONING, LATITUDE AND LONGITUDE, GREAT-CIRCLE SAILING, SAILINGS, &c.

**NAVIGATION, Laws as to.** By the law of nature and of nations, the navigation of the open sea is free to all the world. The open sea means all the main seas and oceans beyond three miles from land. The sea within three miles from land is called the territorial sea, and each state has a kind of property in such sea, and has a right to regulate the use thereof. Hence, it was natural that in early times, before the laws of commerce were properly understood, each state should endeavor to exclude foreigners from that part of the sea so as to secure to its own subjects the benefits of the carriage of goods in ships, which has always been an increasing source of wealth. In England, however, as in most countries, the first care seems to have been bestowed on the navy, as the great means of defending the realm against enemies, and trading-ships came to be first subject to statutory regulation only as being in some way ancillary to the interests of the navy. The laws of Oleron were the first code of maritime laws which obtained notice as well as general acceptance in Europe, in the time of Edward I., and the authorship of those laws is claimed by Seldon and Blackstone for Edward I., though the point is disputed by the French writers. By a statute of Richard II., in order to augment the navy of England, it was ordained that none of the lieges should ship any merchandise out of the realm except in native ships, though the statute was soon varied and seldom followed. At length, in 1550, an act was passed with a view to stop the painful trade of the Dutch. It prohibited all ships of foreign nations from trading with any English plantation without a licence from the Council of State. In 1651, the prohibition was extended to the mother-country, and no goods were suffered to be imported into England or any of its dependencies in any other than English bottoms, or in the ships of that European nation of which the merchandise was the genuine growth or manufacture. At the Restoration, these enactments were repealed and continued by the Navigation Act (12 Char. II. c. 18), with the further addition, that the master and three-fourths of the mariners should also be British subjects. The object of this act was to encourage British shipping, and was long believed to be wise and salutary. Adam Smith, however, has the sagacity to see that the act was not favorable to for-

sign commerce or to opulence, and it was only on the ground that defence was more important than opulence, that he said it was "perhaps the wisest of all the commercial regulations of England." In 1826, the statute 4 Geo. IV. c. 41 repealed the Navigation Act, and established a new system of regulations, which were further varied by subsequent statutes, till, under the influence of the free-trade doctrines, new statutes were passed, which reversed the ancient policy. By the law, as now altered, foreign vessels are allowed free commercial intercourse and equality with the ships of this country and its dependencies, except as regards the coasting-trade of the British possessions in Asia, Africa, and America, for the coasting-trade of the United Kingdom is now entirely thrown open to all comers. The advantages of equality and free trade are, however, so far qualified, that in the case of the ships of those nations which do not concede to British ships like privileges, prohibitions and restrictions may be imposed by order in council.

As regards those laws of navigation which effect the property and management of ships, a complete code of regulations is contained in the Merchant Shipping Acts, which are 17 and 19 Vict. c. 104, 18 and 19 Vict. c. 91, 25 and 26 Vict. c. 63, 34 and 35 Vict. c. 110, 36 and 37 Vict. c. 86. 1. As to ownership, registration, and transfer of merchant ships. No ship is deemed a British ship unless she belong wholly to natural-born subjects, denizens, naturalised persons, or bodies corporate, having a place of business in the United Kingdom or some British possession. Every British ship, with a few exceptions as to old ships and small vessels, must be registered, otherwise, it is not entitled to the protection of the British flag. The Commissioners of Customs indicate at what port in the United Kingdom ships may be registered by their officers, and when registered, the ship is held to belong to that port. The name of the ship and its owners must be stated; and as regards joint-ownership, a ship is capable only of being subdivided into sixty-four shares, and not more than thirty-two owners shall own one ship. These registered owners are deemed the legal owners, and so long as the register is unchanged, the ship is held still to belong to them. The only way of transferring the property is by a bill of sale under seal; or if a mortgage is made, it must be made in a particular form, and duly registered, and the priority of title as between several mortgagees is regulated by the date of the entry in the register. 2. As regards the laws concerning merchant seamen, there is established in every such seaport a superintendent, whose business it is to afford facilities for engaging seamen, by keeping registers of seamen, and superintending the making and discharging of contracts. No person is allowed to be employed in a foreign-going ship as master, or as first, or second, or only mate, or in a home-trade passenger-ship as master, or first or only mate, unless he has a certificate of competency or a certificate of service, issued by the Board of Trade only to those who are deemed entitled thereto. The master of every ship above 80 tons burden shall enter into an agreement, of a certain form, with every seaman he carries from the United Kingdom, and in which the names of the seamen, wages, provisions, capacity of service, &c., are set forth. The seamen are not to lose their wages though no freight is earned, or the ship lost. The men are also to have a berth of a certain size, and the ship to be supplied with medicines, log-book, &c. In order to secure general information, every master of a foreign-going ship is bound, within 48 hours after arriving at the final port of destination in the United Kingdom, to report his ship. Unseaworthy or overloaded ships may be surveyed by the Board of Trade and detained. 3. As regards the liability of shipowners for loss or damage, it is provided by statute that no owner of a sea-going ship shall be liable to make good any loss or damage occurring without his actual fault or privity, to goods or things on board, by reason of fire on board the ship; or to any gold, silver, diamonds, watches, jewels, or precious stones on board, by reason of robbery or embezzlement, unless the true nature and value of such articles have been inserted in the bill of lading. And in cases where loss to goods occurs without his actual fault or privity, the owner shall not be liable in damages to an aggregate amount exceeding £3 per ton of the ship's tonnage. In case of loss of life or personal injury caused by mismanagement of the ship, but without the actual fault or privity of the owners, they shall not be liable beyond £15 per ton. In case of accidents, whereby a large number of persons have been killed or injured, and to prevent a multiplicity of actions, the sheriff of the county is to empanel a jury and inquire into the question of liability. If the owners are found liable, then £30 is to

be assessed as the damages for each case of death or personal injury. In case of death, such sum is to be paid to the husband, wife, parent or child of the deceased. If any person consider this is not sufficient damages, then on returning such sum, he may commence an action; but unless he recover double that sum, he must pay costs. See also PILOTS and LIGHT-HOUSES.

**NAVIGATORS',** or Samoan Islands, a group of nine islands, with some islets, in the Pacific Ocean, lying north of the Friendly Islands, in lat.  $13^{\circ} 30'$ — $14^{\circ} 30'$  s. and long.  $168^{\circ}$ — $173^{\circ}$  w. The four principal islands of the group are Manna, Tutuila, Upolu, and Savail. Of these, Savail, 40 miles in length by 30 miles broad, and having a population of 20,000, is the largest. Area of the group estimated at 2650 square miles; population about 56,000. With the exception of one (Rose Island), the N. I. are all of volcanic origin. For the most part they are lofty, and broken and rugged in appearance, rising in some cases to upwards of 2500 feet in height, and covered with the richest vegetation. The soil, formed chiefly by the decomposition of volcanic rock, is rich, and the climate is moist. The forests, which include the bread-fruit, the cocoa-nut, banana and palm-trees, are remarkably thick. The orange, lemon, tacea, (from which a kind of sago is made), coffee, sweet potatoes, pine-apples, yams, nutmeg, wild sugar-cane, and many other important plants, grow luxuriantly. Until recently, when swine, horned cattle, and horses were introduced, there were no traces among these islands of any native mammalia except a species of bat. The natives are well formed (especially the males), ingenious, and affectionate. The women, who superintend the indoor work and manufacture mats, are held in high respect. There are English and American mission stations on the islands, as well as several Roman Catholic establishments, and many of the natives have embraced Christianity. The government is in the hands of the hereditary chiefs. In 1876, Col. Steinberger, from the United States, established himself as (virtually) dictator of the N. I., but was removed by the commander of a British war-vessel in 1876. Trade is carried on with Sydney.

**NAVY, British.** Owing to the insular position of Great Britain, her navy has long been considered a matter of vital importance, and is the service in which every inhabitant takes a peculiar pride. In considering the history of the British navy, it is convenient to divide the subject into *matériel* and *personnel*. The latter had no distinct organisation till the time of Henry VIII.; but of the former, we recognise in the earliest times the germ of subsequent glories. Cæsar, a Roman general who had thrown off his dependence on the empire, maintained himself in England for several years by his fleet, with which he prevented the imperial forces from reaching the island. The Saxons brought maritime prowess with them to the British shores, but appear soon to have lost it amid the rich provinces in which they settled. Some organisation for the defence of the coast was, however, maintained, and Alfred the Great availed himself of it to repulse the Danes; he at the same time raised the efficiency of his navy by increasing the size of his galleys, some being built which were capable of being rowed by thirty pair of oars. Under his successors, the number of vessels increased, and both Edward and Athelstan fought many naval battles with the Danes. Edgar aspired to be lord of all the northern seas, and had from three to five thousand galleys, divided into three fleets on the western, southern, and eastern coasts respectively; but the size of most of these ships was very insignificant, and the greater part were probably mere row-boats. Ethelred II. formed a sort of naval militia, enacting that every owner of 510 hydes of land should build and furnish one vessel for the service of his country.

William the Conqueror established the Cinque Ports, with important privileges, in return for which they were bound to have at the service of the crown for 15 days in any emergency, 52 ships carrying 24 men each. Richard I. took 100 large ships and 50 galleys to Palestine. John claimed the sovereignty of the seas, and required all foreigners to strike to the English flag; a pretension which has been the cause of some bloody battles, but which England proudly upheld in all dangers. (This honor was formally yielded by the Dutch in 1673, and the French in 1704; and, although not now exacted in its fulness, the remembrance of the right survives in requiring foreign vessels to salute *first*). In the same king's reign, a great naval engagement with the French took place (1293) in mid-channel, when 250 French vessels were captured. The Edwards and the Henries maintained the glory of the

British flag; Edward III., in person, with the Black Prince, at the battle of Sluys, in 1340, defeated a greatly superior French fleet, with 40,000 men on board. Henry V. had "great shippes, carrakes, barges, and ballyngers;" and at one time collected vessels enough to transport 25,000 men into Normandy. Henry VII. was the first monarch who maintained a fleet during peace; he built the *Great Harry*, which was the earliest war-vessel of any size, and which was burned at Woolwich in 1553.

To Henry VIII., however, belongs the honor of having laid the foundation of the British navy as a distinct service. Besides building several large vessels, of which the *Henry Grace de Dieu*, of 72 guns, 700 men, and probably about 1000 tons, was the most considerable, he constituted a permanent personnel, defusing the pay of admirals, vice-admirals, captains, and seamen. He also established royal dockyards at Deptford, Woolwich, and Portsmouth; and for the government of the whole service, instituted an Admiralty and Navy Board, the latter being the forerunner of the present Trinity Board. When this king died, he left 50 ships of various sizes, manned by about 8000 hands.

Under Edward VI., the navy fell off, but was sufficiently important in the succeeding reign for the English admiral to exact the salute to his flag from Philip II. with a larger Spanish fleet, when the latter was on his way to espouse Queen Mary. Elizabeth had the struggle with the Spanish Armada to try her navy, and left 43 ships, of 17,000 tons in all, and 8346 men—15 of her ships being upwards of 600 tons. From this period the tonnage of the ships steadily increased. Under James I. and Charles I., Mr Phineas Pett, M.A., the first scientific naval architect, remodelled the navy, abolishing the lofty forecables and poops, which had made earlier ships resemble Chinese junks. In 1610, he laid down the *Prince-Royal*, a two-decker, carrying 64 large guns; and in 1637, from Woolwich, he launched the celebrated *Sovereign of the Seas*, the first three-decker, and certainly the largest ship hitherto constructed on modern principles. She was 232 feet in length, of 1687 tons, and carried at first 130 pieces of cannon; but being found unwieldy, was cut down, and then proved an excellent ship. She was burned in 1696.

Prince Rupert's devotion to the crown was bad for the navy, for he carried off 25 large ships; and Cromwell, on acceding to power, had but 14 two-deckers. His energy, however, soon wrought a change, and in five years he had 150 ships, of which a third were of the line; his crews amounted to 20,000 men. During the Protectorate, Peter Pett, son of Phineas, built the *Constant Warwick*, the earliest British frigate, from a French design and pattern. Cromwell first laid navy estimates before parliament, and obtained £400,000 a year for the service. The Duke of York, afterwards James II., assisted by the indefatigable Mr. Samuel Pepys, did much for the navy, establishing the system of Admiralty government much on its present footing. In his time, Sir Anthony Deane improved the model of ships of war, again after a French design. James left, in 1688, 108 ships of the line, and 65 other vessels; the total tonnage of the navy, 101,893 tons; the armament, 6980 guns; and the personnel, 42,000 men. William III. sedulously augmented the force, foreseeing its importance to his adopted country. When he died, there were 272 ships of 159,020 tons, and the annual charge for the navy had risen to £1,056,915. George II. paid much attention to his fleets, and greatly augmented the size of the ships; he left, in 1760, 412 ships of 321,104 tons. By 1783, the navy had risen to 617 ships of 500,000 tons; and by 1802 to 700 sail, of which 148 were of the line. In 1818, there were 1000 ships (256 of the line), measuring about 900,000 tons, and carrying 146,000 seamen and marines, at an annual charge of about £18,000,000. Since the peace in 1815, the number of vessels has been greatly diminished, although their power has vastly increased.

The progressive augmentation of size in vessels may be judged from the increase in first-rates. In 1677, the largest vessel was from 1500 to 1600 tons; by 1720, 1800 had been reached; by 1745, 2000 tons; 1780, 2200 tons; 1795, 2350 tons; 1800, 2500 tons; 1808, 2616 tons; 1858, 4000 tons. From 1841, a gradual substitution of steam for sailing vessels began, which was not completed, however, till 1859. Since 1860, another reconstruction has taken effect, armor-plated frigates, impervious to ordinary shot, armed either as broadside vessels or in turrets, being substituted for timber vessels. At the same time three and two deckers have ceased to be employed, enormous frigates and turret-ships replacing them of a tonnage far exceeding the



Naxos  
Neal

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largest three-deckers of former times; they mount fewer guns, but those they carry are of stupendous calibre, and of rifled bore. The *Northumberland*, one of the largest frigates of this new class, is of 6621 tons, 1350 horse-power, and 83 large guns, while the *Devastation* carries 4 great guns in turrets of the most massive armor. The *Inflexible* (turret-ship) carries four 81-ton guns, and is supposed to be the most powerful war-ship in the world.

On the 1st of April 1874, the effective vessels of the navy were as follows: 33 armor-plated frigates (3 building); 14 turret vessels (2 building); 3 armor-plated corvettes; and two sloops; 3 floating batteries; 3 armored gunboats; 37 ships of the line (10 without steam); 43 frigates (7 without steam); 42 corvettes, (7 building, 5 without steam); 46 sloops (3 building and 4 without steam); 43 gun-vessels; 69 smaller steamers (10 building); 71 gunboats; with 17 transports, 6 yachts, and 5 schooners; giving a total of 424 vessels. At the end of 1877 there were in all 249 ships in commission, exclusive of Indian troop-ships. The personnel of the navy amounted in 1877 to 60,000 men, including 14,000 marines, but excluding artificers and laborers in dockyards; the armament being about 5000 guns, mostly of heavy calibre. The annual charge for 1874-5 was estimated at £10,179,488, which may be thus broadly subdivided (in 1878-9 it was £11,053,091):

Wages, Victuals and Clothing of Officers and Men.....	£3,667,071
Admiralty Office.....	178,068
Coast-Guard and Naval Reserve.....	163,311
Scientific Branch (Surveying, Hydrography, &c.).....	111,170
Dockyards and Victualling Yards.....	1,253,211
Stores for Building and Repairing Ships.....	1,851,068
Miscellaneous Services.....	964,111
Half-pay and Pensions.....	1,816,996
Conveyance of Troops.....	175,000

£10,179,488

Information on the various points of detail connected with the navy, will be found under the respective heads, as ADMIRAL, CAPTAIN, HALF-PAY, SHIP-BUILDING, SIGNALS, &c.

NA'XOS, the largest, most beautiful, and most fertile of the Cyclades, is situated in the *Ægean*, midway between the coasts of Greece and Asia Minor. Extreme length, about 20 miles; breadth, 15 miles. Pop. about 12,000. The shores are steep, and the island is traversed by a ridge of mountains, which rise to the highest summit, *Dia*, upwards of 3000 feet. The plains and valleys are well watered; the principal products and articles of export are wine, corn, oil, cotton, fruits and emery. The wine of N. (the best variety of which is still called in the islands of the *Ægean*, *Bacchus-wine*) was famous in ancient as it is in modern times, and on this account the island was celebrated in the legends of *Dionysius*, and especially in those relating to *Ariadne*. Among its antiquities are a curious Hellenic tower, and an unfinished colossal figure, 34 feet long, still lying in an ancient marble quarry in the north of the island, and always called by the natives a figure of *Apollo*. It was ravaged by the Persians, 490 B.C., and after the conquest of Constantinople by the Latins, became the seat of a dukedom, founded by the Venetians. It now forms a portion of the kingdom of Greece (q. v.). Naxos, the capital, with a population of about 5000, is situated on the north-west coast, contains 16 Greek, and 4 Catholic churches, and 3 convents, and is the seat of a Greek and a Latin bishop.

NAZARE'NE (Gr. *Nazarenos* and *Nazaraios*, an "inhabitant of Nazareth") was used by the Jews as one of the designations of our Lord, and afterwards became a common appellation of the early Christians in Judæa. Although, originally, it is but a local appellation, there can be no doubt that as Nazareth was but a second-rate city of the despised province of Galilee, it was eventually applied to our Lord and his followers as a name of contempt (John xviii. 5, 7; Acts xiv. 5).—For the Judaizing sect called Nazarenes, see EBIONITES.

NA'ZARETH, a small town or village of Palestine, anciently in the district of Galilee, and in the territory of the tribe of Zebulun, 21 miles south-east of Acre. It lies in a hilly tract of country, and is built partly on the sides of some rocky ridges,

partly in some of the ravines by which they are seamed. It is celebrated as the scene of the Annunciation, and the place where the Saviour spent the greater part of his life in obscure labor. Pop., according to Dr Robinson, \$120, of whom 1040 are Greeks, 520 Greek Catholics, 480 Latins, 400 Maronites, and 680 Mohammedans. Porter thinks 4000 a moderate estimate. In the earliest ages of Christianity, N. was quite overlooked by the church. It did not contain a single Christian resident before the time of Constantine, and the first Christian pilgrimage to it took place in the 6th century. The principal building is the Latin convent, reared, according to pious tradition, on the spot where the angel announced to the Virgin the birth of her Saviour-son; but the Greeks have also erected, in another part of N., a church on the scene of the Annunciation. Besides these rival edifices, the traveller is shewn a Latin chapel, affirmed to be built over the "workshop of Joseph;" also the chapel of "The Table of Christ" (*Mensa Christi*), a vaulted chamber, containing the veritable table at which our Lord and his disciples used to eat; the synagogue, out of which he was thrust by his townsmen; and "the Mount of Precipitation," down which he narrowly escaped being cast headlong. The women of the village have been long famous for their beauty.

NAZARITES (from Heb. *nazar*, to separate) denoted among the Jews those persons, male or female, who had consecrated themselves to God by certain acts of abstinence, which marked them off or "separated" them from the rest of the community. In particular they were prohibited from using wine or strong drink of any kind, grapes, whether moist or dry, or from shaving their heads. The law in regard to N. is laid down in the Book of Numbers (vi. 1-21). The only examples of the class recorded in Scripture are Samson, Samuel, and John the Baptist, who were devoted from birth to that condition, though the law appears to contemplate temporary and voluntary, rather than perpetual Nazaritiship.

NEAGH, Lough, the largest lake of the British Islands, is situated in the province of Ulster, Ireland, and is surrounded by the counties of Armagh, Tyrone, Londonderry, Antrim, and Down. It is 18 miles (English) in length, and 11 miles in breadth, contains 98,255 acres, is 120 feet in greatest depth, and is 48 feet above sea-level at low water. It receives the waters of numerous streams, of which the principal are the Upper Bann, the Blackwater, the Moyola, and the Main; and its surplus waters are carried off northward to the North Channel by the Lower Bann. Communication by means of canals subsists between the Lough and Belfast, Newry, and the Tyrone coal-field. In some portions of the Lough the waters shew remarkable petrifying qualities, and petrified wood found in its waters is manufactured into houses. The southern shores of the Lough are low and marshy, and dreary in appearance. It is well stocked with fish, and its shores are frequented by the swan, heron, bittern, teal, and other water-fowl.

NEAL, Daniel, a dissenting minister and author, was born in London, December 14, 1678. He was educated first at Merchant Taylors' School, and afterwards at Utrecht and Leyden, in Holland, and in 1706 succeeded Dr Singleton as pastor of a congregation in his native city. N.'s first work was a "History of New England" (1720), which met with a very favorable reception in America. Two years afterwards, he published a tract entitled, "A Narrative of the Method and Success of Inoculating the Small-pox in New England by Mr Benjamin Colman," which excited considerable attention; but the production on which his reputation rests is his "History of the Puritans" (4 vols. 1732-1738), a work of great labor, and invaluable as a collection of facts and characteristics both to churchmen and dissenters, though, of course, written in the interest of the latter. It involved its author in several controversies, which failing health rendered it impossible for him to prosecute. N. died at Bath, April 4, 1748.

NEAL, John, an American author and poet, of Scottish descent, was born at Falmouth, now Portland, Maine, August 25, 1793. His parents belonged to the Society of Friends, of which he was a member until disowned, at the age of 25, because he failed to live up to the rule of "living peaceably with all men." With the scanty education of a New-England common school, he became a shop-boy at the age of 12; but learned and then taught penmanship and drawing. At the age of 21, he entered a haberdashery trade, first in Boston, and then in New York; and a year after, became a wholesale jobber in this business at Baltimore, in partnership with

Neander  
Nebraska

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another American literary and pulpit celebrity, John Pierpont. They failed in 1816, and N. turned his attention to the study of law. With the energy which acquired for him the *sobriquet* of "John O'Cataraet," affixed to his poem, "The Battle of Niagara," he went through the usual seven years' law-course in one, besides studying several languages, and writing for a subsistence. In 1817, he published "Keep Cool," a novel; the next year a volume of poems; in 1819, "Otho," a five-act tragedy; and in 1823, four novels—"Seventy-six," "Logan," "Randolph," and "Errata." These impetuous works were each written in from twenty-seven to thirty-nine days. In 1824, he came to England, where he became a contributor to "Blackwood's" and other magazines and reviews, and enjoyed the friendship and hospitality of Jeremy Bentham. On his return to America, he settled in his native town, practised law, wrote, edited newspapers, gave lectures, and occupied his leisure hours in teaching boxing, fencing and gymnastics. Among his numerous works are "Brother Jonathan," "Rachel Dyer," "Bentham's Morals and Legislation," "Authorship," "Down-easters," &c. After a long silence, devoted to professional business, he published, in 1854, "One Word More;" and in 1859, "True Womanhood." The latter work, though a novel, embodies the more serious religious convictions of his later years. In 1870, appeared his "Wandering Recollections of a Somewhat Busy Life." N.'s voluminous writings, with all their glaring faults of haste and inexperience, are full of genius, fire, and nationality.

NEANDER, Johann August Wilhelm, by far the greatest of ecclesiastical historians, was born at Göttingen, 16th January 1789, of Jewish parentage. His name prior to baptism was David Mendel. By the mother's side, he was related to the eminent philosopher and philanthropist Mendelssohn (q. v.) He received his early education at the Johanneum, in Hamburg, and had for companions Varnhagen von Ense, Chamisso, the poet, Wilhelm Neumann, Nooldt, and Sieveking. Already the abstract, lofty, and pure genius of N. was beginning to shew itself. Plato and Plutarch were his favorite classics as a boy; and he was profoundly stirred by Schleiermacher's famous "Discourses on Religion" (1799). Finally, in 1806, he publicly renounced Judaism, and was baptized, adopting, in allusion to the religious change which he had experienced, the name of N. (Gr. *neos*, new; *aner*, a man), and taking his Christian names from several of his friends. His sisters and brothers, and later his mother also, followed his example. He now proceeded to Halle, where he studied theology with wonderful ardor and success under Schleiermacher, and concluded his academic course at his native town of Göttingen, where Planck was then in the zenith of his reputation as a church historian. In 1811, he took up his residence at Heidelberg University as a privat-docent; in 1812, he was appointed there extraordinary professor of theology; and in the following year, was called to the newly established university of Berlin as Professor of Church History. Here he labored till his death, July 14, 1850. N. enjoyed immense celebrity as a lecturer. Students flocked to him not only from all parts of Germany, but from the most distant Protestant countries. Many Roman Catholics, even, were among his auditors, and it is said that there is hardly a great preacher in Germany who is not more or less penetrated with his ideas. His character, religiously considered, is of so noble a Christian type that it calls for special notice. Ardent and profoundly devotional, sympathetic, glad-hearted, profusely benevolent, and without a shadow of selfishness resting on his soul, he inspired universal reverence, and was himself, by the mild and attractive sanctity of his life, a more powerful argument on behalf of Christianity than even his writings themselves. Perhaps no professor was ever so much loved by his students as Neander. He used to give the poorer ones tickets to his lectures, and to supply them with clothes and money. The greater portion of what he made by his books, he bestowed upon missionary, Bible, and other societies, and upon hospitals. As a Christian scholar and thinker, he ranks among the first names in modern times, and is believed to have contributed more than any other single individual to the overthrow, on the one side, of that anti-historical Rationalism, and on the other of that dead Lutheran formalism, from both of which the religious life of Germany had so long suffered. To the delineation of the development of historical Christianity, he brings one of the broadest, one of the most sagacious (in regard to religious matters), one of the most impartial yet generous and sympathetic intellects. His conception of church history as the record and portraiture of all forms of Christian thought and life, and the

skill with which, by means of his sympathy with all of these, and his extraordinary erudition, he elicits, in his "Kirchengeschichte," the varied phenomena of a strictly Christian nature, have placed him far above any of his predecessors. N.'s works, in the order of time, are: "Ueber den Kaiser Julianus und sein Zeitalter" (Leip. 1812); "Der Heil. Bernhard und sein Zeitalter" (Berl. 1813); "Genetische Entwicklung der vornehmsten Gnoſtischen Systeme" (Berl. 1818); "Der Heil. Chrysostomus und die Kirche, besonders des Orients, in dessen Zeitalter" (2 vols. Berl. 1821—1822; 3d ed. 1849); "Denkwürdigkeiten aus der Geschichte des Christenthums und des Christlichen Lebens" (8 vols. Berl. 1822; 3d ed. 1845—1846); "Antignosticus, Geist des Tertullianus und Einleitung in dessen Schriften" (Berl. 1826); "Allgemeine Geschichte der Christlichen Religion und Kirche" (6 vols. Hamb. 1835—1837); "Geschichte der Pflanzung und Leitung der Kirche durch die Apostel" (3 vols. Hamb. 1832—1838; 4th ed. 1847); "Das Leben Jesu Christi in seinem geschichtlichen Zusammenhange," written as a reply to Strauss's work (Hamb. 1837; 5th ed. 1863); "Wissenschaftliche Abhandlungen," published by Jacobi (Berl. 1851); "Geschichte der Christlichen Dogmen," also published by Jacobi (1856). The majority of these works, including the most important, have been translated into English, and form more than a dozen volumes of Bohn's "Standard Library."

NEAP-TIDES. See TIDES.

NEARCHUS, the commander of the fleet of Alexander the Great in his Indian expedition, 327—326 B.C., was the son of one Adrotimus, and was born in Crete, but settled in Amphipolis. In 329 B.C., he joined Alexander in Bactria with a body of Greek mercenaries, and when the latter ordered a fleet to be built on the Hydaspes, N. received the command of it. He conducted it from the mouth of the Indus to the Persian Gulf, in spite of great obstacles, resulting partly from the weather and partly from the mutinous disposition of his crews. N. left the Indus on the 21st of September 326, and arrived at Susa, in Persia, in February 324, shortly after Alexander himself, who had marched overland. Fragments of his own narrative of his voyage have been preserved in the "Indica" of Arrian.—See Dr Vincent's "Commerce and Navigation of the Ancients in the Indian Seas" (vol. i. pp. 68—77, Lond. 1807), and Geler's "Alexandri Magni Historiarum Scriptores" (pp. 108—150).

NEATH, a parliamentary and municipal borough and river-port of the county of Glamorgan, South Wales, on a navigable river of the same name, seven miles south-east of Swansea. It is built on the site of the Roman station *Nidum*, and it contains the remains of an ancient castle, burned in 1231. In the immediate vicinity are the imposing ruins of Neath Abbey, described by Leland as "the fairest abbey in all Wales," but now sadly decayed and begrimed by the smoke and coal-dust of the public works of the district. There are at N. several extensive copper and tin works. Copper, spelter, iron and tin plates, and flue bricks are extensively exported, stones are quarried, and coal and culm are raised. The trade of the port has largely increased within late years. Pop. (1871) 10,060.

NEB-NEB, or Nib-Nib, the dried pods of *Acacia Nilotica*, one of the species of *Acacia* (q. v.) which yield gum-arabic, and a native of Africa. These pods are much used in Egypt for tanning, and have been imported into Britain.

NEBRASKA, one of the United States of America, lying in lat. 40°—43° n., and long. 96°—104° w.; bounded on the w. by Wyoming, and n. by Dakota, being partly separated from the latter by the Missouri River, and its branch the Niobrara; e. by Iowa and Missouri, from which it is separated by the Missouri River; s. by Kansas and Colorado. This state is about 425 miles from east to west, and from 138 to 208 from north to south, and has an area estimated at 75,995 square miles. Originally, when this state was a territory, it extended from the Missouri River to the Rocky Mountains, and from lat. 40° to the boundary of what was, at the time, British America. The chief towns are Omaha City, the starting-point of the Union Pacific Railway, Nebraska City, and Lincoln, the capital. N. is a vast plain rising gradually toward the Rocky Mountains, with immense prairies, the haunts of vast herds of buffalo, and with fertile and well-timbered river-bottoms. The chief rivers are the Missouri on its eastern, and the Niobrara, partly on the northern boundary, the Platte or Nebraska, and the Republican Fork of the Kansas, and their branches. The Platte Valley, running through the whole centre of the territory, is broad and

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fertile. There are quarries of sandstone, a soft limestone which hardens on exposure, and thin beds of coal. In the mountainous western region are mines of gold, silver, copper, and cinnabar. Between the fertile lands of the eastern and central portion and the mountains is a great desert valley of 30 by 90 miles, 300 feet deep, full of rocky pinnacles, and rich in fossil remains. The climate is dry and salubrious, with an abundance of clear sunny days. The country produces wheat, maize, hemp, tobacco, and fruits in abundance, while the rolling prairies afford unequalled pasturage. The Omahas, Pawnees, Otoes, Sioux, and other wild tribes hunt over the unoccupied territories, but the immigration is progressing rapidly. Erected as a territory in 1854, it had, in 1860, a population, exclusive of Indians, of 28,836; and in 1880, with the same exclusion, it was 452,402. N. became a state in 1867. See "Nebraska," by Edwin A. Curley (Lond. 1875).

NEBRASKA, or Platte, a river of Nebraska, one of the United States of America, rises in the Rocky Mountains, lat.  $42^{\circ} 30'$  N., long.  $109^{\circ}$  W. and flowing easterly 600 miles through the entire territory, watering its great valley, falls into the Missouri.

\* NEBUCHADNEZZAR. See BABYLON.

NEBULÆ, a name given to indistinct patches of light in the heavens, supposed to proceed from aggregations of rarely distributed matter belonging to distant worlds in the course of formation. By the gradual improvement of telescopes in power and distinctness, these nebulae have, one after another, become resolved into clusters of distinct stars, and it is now generally supposed that such a resolution of all nebulae which have been observed is only limited by the power of the telescope. It is probable that the group of stars with which our system is immediately surrounded, and which forms to our eyes the galaxy which studs the firmament, would, if looked upon from the immeasurable distances at which these so-called nebulae are situated, itself assume the appearance of such a nebula; and that in the intervals there exist spaces as void of starry worlds as these are comparatively full of them. See STARS. Some nebulae are of a round form, presenting a gradual condensation toward the centre; others consist of one star surrounded by a nebulous haze; while a third class present just the same appearance as would be exhibited by the solar system if seen from a point immensely distant. These and other phenomena suggested to Laplace the idea, afterwards developed into a theory, and known as the *nebular hypothesis*, that these nebulae were systems in process of formation; the first stage presenting an agglomeration of nebulous matter of uniform density, which, in the second stage, showed a tendency to gradual condensation toward the centre; and, finally, the nebulous matter round the now-formed centre of the system, separated itself into distinct portions, each portion becoming condensed into a planet. The same opinion regarding the formation of planets from nebulae was put forward by Sir William Herschel in 1811; but the subsequent discoveries made by Lord Rosse were supposed to expose a fallacy in this theory. That wonderful instrument, the spectroscopic, has, however, recently reinstated the nebular theory, by shewing that among these appearances there are real nebulae devoid of solid or liquid matter, and consisting of masses of glowing gas—apparently nitrogen and hydrogen.

NE'BULY, one of the partition lines in Heraldry, which runs out and in, in a form supposed to represent the uneven edges of clouds.

NECESSITY. This word occurs in connection with two different philosophical subjects, namely, the freedom of the will (see FREE-WILL), and the nature of our belief in fundamental truths, such as the axioms of mathematics. It is alleged by some philosophers, that the truths held by us as most certain are the result of experience, and that the degree of certainty is but a measure of the universality of the experience. Others contend that such first principles as the axioms of mathematics are not only true, but *necessarily* true. Such necessity, it is argued, cannot come from mere experience, and therefore implies an innate or intuitive source. Hence the theory of necessary truth is only another name for the theory of instinctive or intuitive truth.

Necessity is a word too vague in its signification to serve as a leading term in philosophy. There are several meanings attaching to it, which should be clearly set forth before entering on the discussion of such questions as those above mentioned.

1. Necessity, in the first place, means that one fact or statement is *implied* in another. Thus, if we say that all the apostles were Jews, it follows necessarily that Peter was a Jew; this is not a new fact, but merely a re-assertion of a portion of the same fact. We are not at liberty to affirm a thing in one form, and then deny the same thing when expressed in a different form. If we say this room is hot, it is repeating the assertion in another way, to say that it is not cold. These truths follow by necessary inference. Hence the general axiom of the syllogism, that what is true of a whole class must be true of each individual, is a necessary truth in this sense. In affirming such a truth, we merely declare that we shall be consistent, and that when we have affirmed a proposition in company with other propositions, we are prepared to affirm it when taken apart from the others. This kind of necessity is sometimes called Logical necessity, and sometimes Mathematical necessity. We might call it Deductive necessity, or necessity by Implication.

2. A second meaning is Inductive certainty; or the certainty that arises from a well-grounded experience. That lead will sink in water; that animals need food and air in order to live; that warmth promotes vegetation; are truths that we call necessary, in the sense of being so certain that we may always count upon them. We presume with the highest confidence, that an unsupported body will fall to the ground, not because the fact of falling is implied in the fact of matter, but because nature has uniformly conjoined the two facts. We can speak even of moral necessity; by which we mean only uniform sequence and consequent certainty. When we declare that children, whose education has been neglected, must fall into evil courses, we declare what experience has shewn us will happen in relation to the human mind.

3. When necessity means neither deductive implication, nor inductive certainty, it refers us to a peculiar test supposed to apply to the truths in dispute—namely, the inconceivableness of their opposite. It is said that, not only can we not *believe* in the opposite of the axiom, that "the sums of equals are equal," but we cannot even *conceive*, imagine, or picture to ourselves the opposite of it. This impossibility of conceiving the contradiction of any statement, is regarded by many as a peculiar cogent circumstance in its favor. It distinguishes the axiomatic first principles from the truths of inductive science, these having, it is said, an inferior order of certainty. To this it may be replied, however, that men's power of conceiving is so much affected by their education and habits, that many things, whose opposites were at one time inconceivable, have since been found to be false. For example, the notion that men could live at the antipodes was once reckoned inconceivable, and we now know it to be a fact. An unvarying association will often produce a disability to conceive anything different.

In commencing a discussion as to the necessary character of any truth, the disputants should agree beforehand which of the three meanings they intend. In the controversy on the Mathematical axioms, maintained between Dr Whewell on the one hand, and Sir John Herschel and Mr J. S. Mill on the other, the third meaning is more particularly involved. The doctrine of Inconceivability, as the test of truth, has been put forward by Mr Herbert Spencer, under the title of the Universal Postulate ("Principles of Psychology," Part I.).

NECHES, a river of Texas, U. S., rises in the central eastern portion of the state, and flows south by east, 200 miles, into Sabine Bay, where its waters, with those of the Sabine River, find their way, by Sabine Pass, into the Gulf of Mexico.

NECKAR, one of the largest tributaries of the Rhine, and the principal river of Württemberg, rises near to the source of the Danube, on the eastern declivity of the Black Forest, and close to the village of Schweningen. It has a winding course of 240 miles, first north-east to its junction with the Fils, then north to its junction with the Jaxt, and finally north-west to Mannheim, where it joins the Rhine. The principal places on its banks are Tübingen, Heilbron, Heidelberg, and Mannheim. Its course, leading first through a deep and narrow dale, leads afterwards through a succession of wide and fertile tracts, enclosed by soft vine-clad hills. The scenery of its banks is, in general, very beautiful, and in many places highly romantic. From Cannstadt, about midway in its course, the N. is navigable; steamers ply regularly to Heidelberg. Good wines are grown on its banks. Chief affluents, on the left, the Enz; on the right, the Fils, the Neckar, the Kocher and the Jaxt.

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NECKER, Jacques, a famous financier and minister of France, was born 30th September 1732, at Geneva, where his father, a native of Brandenburg, but of Anglo-Irish descent, was professor of German law. He became a banker in Paris, and acquired a large fortune during the Seven Years' War. After retiring from business, he became the representative of his native city at the French court, and also acquired a high but not exactly a solid reputation by his publications on political economy and finance, particularly his "*Essai sur la Législation et le Commerce de Grains*" (Par. 1775). In this essay he appears as the opponent of the wise Turgot's liberal measures in regard to the traffic in grain, and claims for the state the right of fixing its price, and if he thinks it necessary, of prohibiting its exportation. On the removal of Turgot from office in June 1776, N. was called to assist in financial affairs, and after the brief administration of Clugny, he was made General Director of Finances in June 1777. N. could not conceal his elation. This was his weak point. He had all the vanity, egotism, and love of show that marked his brilliant but superficial daughter. Nevertheless, he succeeded not only in meeting the exigencies of the American war, but in restoring to some degree of order the general financial affairs of the country, though mainly by the perilous expedient of borrowing, which he was enabled to do to an almost unlimited extent, owing to the confidence reposed in his financial dexterity. Some years he borrowed as much as 490 millions of francs. His Protestantism, however, and some retrenchments which he made in the royal household, with his publication on the financial affairs of France ("*Compte Rendu*," which produced an immense sensation), made him an object of great dislike to the queen and court, and on 12th May 1781 he was suddenly dismissed. He retired to Geneva, where he was visited, from motives of sympathy and respect, by the highest personages in the realm, the Prince of Condé, the Dukes of Orleans and Chartres, the Prince of Beaufort, the Duke of Luxembourg, Maréchal de Richelieu, the Archbishop of Paris, &c., but returned to Paris in 1787, from which he was soon banished on account of an attack which he published on the financial management of the reckless and ignorant Calonne. In the financial and political crisis, however, which followed upon the financial administration of Loménie de Brienne, Louis XVI. found himself under the necessity of calling N. in November 1788, to the office of Comptroller-General of Finances and Minister of State. N. recommended the calling of the States General, and thereby acquired the greatest popularity. He failed, however, in the difficulties which ensued, having no capacity for political affairs in other than their mere financial aspects. When the court, on the 23d June, 1789, determined upon nullifying the resolution of the third estate, N. hesitated, and the king therefore dismissed him on 11th July, and required him to leave the French dominions immediately. He obeyed, but the disturbances of the 12th, 13th, and 14th of July (on the last of which days the Bastille was taken) were the result of his dismissal, and the king was under the necessity of recalling him. He now allied himself with Mounier and other ministers for the introduction of a constitution like that of Britain, with two chambers or Houses of Parliament; but this caused a great diminution of his popularity, and he was unable to contend in debate with Mirabeau and other great leaders of the National Assembly. On the rejection by the assembly of his scheme of a loan, and the adoption instead of it of Mirabeau's scheme of assignats, he resigned his office in September 1790, and retired to his estate of Coppet, near Geneva, where he died, 9th April, 1804. Besides the works already mentioned, he published several on political and on religious subjects, particularly a work on the French Revolution (4 vols. Par. 1796), which has been frequently reprinted. His daughter was the celebrated Madame de Staël.

NECK-MOULDING. A moulding at the junction of the capital and shaft of a column. The plain space between the astragal of the shaft and the mouldings of the cap of the Roman Doric order is called the *neck*.

NECROMANCY (Gr. *nekros*, dead, and *mantia*, divination), a mode of divination by the conjuring up of the dead to question them concerning the future. It originated in the East, and in times of the most remote antiquity. It is condemned in the Old Testament; and the story of the witch of Endor affords a remarkable illustration of it, which has not a little perplexed interpreters of Scripture. The eleventh book of Homer's "*Odyssey*" bears the title of *Nekromanteia*, and in it the shade of Tiresias is represented as brought up and consulted by Ulysses. In

most parts of Greece, necromancy was practised by priests or consecrated persons in the temples: in Thessaly, it was the profession of a distinct class of persons called *Psychagogoi* ("Evokers of Spirits). The practice of it in that country was ultimately connected with many horrid rites, in which human blood, half-burned portions of bodies from funeral piles, the immature foetus cut out of the womb, &c. were employed, and sometimes human beings were slain, that their spirits might be consulted ere they finally passed into the lower world. The establishment of Christianity under Constantine caused necromancy to be placed under the ban of the church. There are evident traces of necromancy in some of the older Norse and Teutonic poems. The medieval belief in the evocation of spirits belongs rather to sorcery than to necromancy. See Peucer's "*Commentarius de Principiis Divinationum Generibus*" (Zerbst, 1591).

**NECROPHILISM**, an unnatural and revolting love or appetite for the dead which has manifested itself in various ways. Consorting or living with the dead has been observed as a characteristic of melancholia. Individuals have inhabited graveyards, preferring the proximity and association of corpses with which they had no tie, to the cheerfulness and comforts of home; and there is recorded one notorious case, in which a gentleman, although on bad terms with his wife while alive, carried her body with him through India, scandalising the natives, and outraging the feelings of all by placing the coffin under his bed. This hideous tendency may enter into certain developments of cannibalism, where the feast is celebrated in memory of a departed friend, rather than in triumph over a slain foe. It is affirmed that there were anthropophagous epidemics in 1436 and 1500; and the history of vampirism connects that delusion with the moral perversion now described. Patients in asylums, especially in continental asylums, are still often encountered who bemoan the crime of having devoured the dead, and violated charnel-houses. The most extraordinary exhibition of necrophilism is where individuals, not in fancy but in reality, have exhumed corpses to see them, to kiss them, to carry them away to their own homes, or to mutilate and tear them to pieces. It is worthy of notice that, so far as such cases have been observed in this country, they have been confined to communities living in remote places, of rude and unenlightened character, and cherishing the superstitions of ages and states of society with which they have no other connection, and of which they have almost lost the recollection.—"*Annales, Médico-Psychologiques*, t. viii." p. 472.

**NECROPOLIS**, a Greek term, meaning the city of the dead, and applied to the cemeteries in the vicinity of ancient cities. It occurs in classical antiquity only as applied to a suburb of Alexandria, lying to the west of that city, having many shops and gardens and places suitable for the reception of the dead. The corpses were received and embalmed in it. Here Cleopatra, the last of the Ptolemies, applied the asp to her breast, to avoid the ignominy of being led in triumph by Augustus. The site of the necropolis of ancient Alexandria seems to have been where are now the catacombs, consisting of galleries and tombs hollowed out of the soft calcareous stone of which the city is built, and lying at the extremity of the city. The term necropolis is now, however, used in a much more extended sense, and applied to all the cemeteries of the ancient world. These consisted either of tombs, constructed in the shape of houses and temples, and arranged in streets, like a city of the dead; or else of chambers hollowed in the rock, and ornamented with fagades, to imitate houses and temples. Such cemeteries are to be distinguished from the *columbaria*, or subterranean chambers of the Romans, in which their urns were deposited; or the rows of tombs along the *Via Appia*; or the cemeteries of the Christians, whose bodies were deposited in the ground. The most remarkable necropolises are that of Thebes in Egypt, situated at a place called Gournah, on the left bank of the Nile, capable of holding 3000 persons, and which it is calculated must at least have contained 5000 mummies; those of El-Kab or Eleithyia; of Beni-Hassan, or the Spéos Artemidos; and of Madfun or Abydos; of Siwah or the Oasis of Ammon. See **OASIS**. In Africa, the necropolis of Cyrene is also extensive; and those of Vulci, Corneto, Tarquinii, and Capua are distinguished for their painted tombs (see **TOMB**), and the numerous vases and other objects of ancient art which have been exhumed from them. Large necropolises have also been found in Lycia, Sicily, and elsewhere.



Strabo, xviii. p. 795—799; Plutarch, vit Anton; Letronne, "Journal des Savans," 1823, p. 108; Denuis, "Cities and Cemeteries of Etruria," i. 412, i. 276—353.

**NECRO'SIS** (Gr. *nekros*, dead) is a term employed to denote the death or mortification of bone, but often restricted to the cases in which the shaft of a long bone dies, either directly from injury or from violent inflammation, and is enclosed by a layer of new bone; the death of a thin superficial layer, which is not enclosed in a shell of new bone, being usually termed *exfoliation*.

The bones of the lower extremity—the femur and tibia—are those which are most frequently affected by necrosis. The lower jaw is, however, extremely often affected by it, in persons engaged in making lucifer-matches; the disease being set up by the pernicious action of the vapor of phosphorus. The dead bone, known as the *sequestrum*, generally consists of the circumference of the shaft only, and not of the interior, and the inside of the dead portion presents a rough appearance, as if worm-eaten. If the membrane investing the bone (the periosteum) remain healthy, it deposits lymph, which speedily ossifies, forming a shell of healthy bone, which completely invests the dead portion.

The essential point in the treatment is the removal of the *sequestrum*, which is too purely a surgical operation to be described in these pages.

**NECTAR**, the name given by Homer, Hesiod, Pindar, and the Greek poets generally, and by the Romans, to the beverage of the gods, their food being called *Ambrosia* (q. v.). But Sappho and Aleman make nectar the food of the gods, and ambrosia their drink. Homer describes nectar as resembling red wine, and represents its continued use as causing immortality. By the later poets, nectar and ambrosia are represented as of most delicious odor; and sprinkling with nectar, or anointing with ambrosia, is spoken of as conferring perpetual youth, and they are assumed as the symbols of everything most delightful to the taste.

**NECTARINE.** See **PEACH**.

**NECTARY**, in Botany, an organ in the flowers of many phanerogamous plants, devoted either to the secretion or the reception of honey. Of the former kind are nectariferous glands, scales, and pores; of the latter, tubes, cavities, &c. But the term was for a long time very vaguely employed by botanists, and seemed to be found convenient for the designation of any part of a flower for which no other name was known. Thus amongst the parts called nectaries by the older botanists, may be found those now called *Disc* (q. v.), and that which bears the name of *Corona* (q. v.).

**NEEDFIRE** (Ger. *nothfeuer*; allied to Sw. *gnida*, to rub; Eng. *knead*), fire obtained by the friction of wood upon wood, or the friction of a rope on a stake of wood, to which a widespread superstition assigns peculiar virtues. With varieties of detail, the practice of raising needfire in cases of calamity, particularly of disease among cattle, has been found to exist among most nations of the Indo-European race. It has been supposed effectual to defeat the sorcery to which the disease is assigned. When the incantation is taking place, all the fires in the neighborhood must be extinguished, and they have all to be relighted from the sacred spark. In various parts of the Scottish Highlands, the raising of needfire was practised not long ago, and it is perhaps still had recourse to in some very remote localities. The sacrifice of a heifer was thought necessary to insure its efficiency. The ways of obtaining fire from wood have been various; one is by an apparatus which has been called the "fire-churn," a cylinder turning on a pivot, and furnished with spokes, by means of which it is made to revolve very rapidly, and fire is generated by the friction. Fire struck from metal has been supposed not to possess the same virtue, and in some instances the persons who performed the ceremony were required to divest themselves of any metal which might be about them. In its origin, the fire-churn was considered a model of the apparatus by which the fires of heaven were daily rekindled. It is still in daily use in the temples of the Hindus. The same superstition was doubtless the origin of the story of Prometheus (q. v.). See Grimm's "Deutsche Mythologie;" Supplement to Jamieson's "Scottish Dictionary."

**NEEDLES** are instruments of metal, or other material, for the purpose of carrying the thread in sewing, embroidery, knitting, netting, and other similar operations. They are generally made of metal, but bone, ivory, and wood are also used;

for ordinary needle-work, called sewing, they are made of fine steel, and are too well known to need description; for other kinds of work, they are often much larger and differently formed, according to the requirements of the work to be done.

Needle-making is an important branch of industrial art, and it has of late years attained to extraordinary perfection. Small bars of steel, not thicker than a good-sized bristle, can be made perfectly round, pointed at one end with wonderful accuracy, pierced at the other end with an oval hole, the sides of which are so smoothly rounded that there is no friction upon the thread, and the whole of each instrument, not more than an inch in length, beautifully polished, and sold at less than a shilling per hundred, notwithstanding that a large part of the operations required in their manufacture are manual. The first operation, after the wire has been selected, and its thickness accurately gauged, is to cut it into eight-foot lengths; this is done by winding it in a coil of 16 feet circumference, and then cutting this coil into exact halves with powerful cutting shears. The coiling of the wire is so managed, that there are 100 pieces in each half when cut; the bundles of 100 wires are again cut into the necessary lengths for two needles; and so well arranged are the cutting shears, that a man can easily cut enough for 1,000,000 needles in a day of 12 hours. The pieces cut from a coil, although now reduced to the length of two small needles, are nevertheless somewhat curved; they are therefore collected into bundles of about 6000, and placed in two iron rings, which hold them loosely together; they are then slightly softened by firing, and are laid on an iron plate or bench, and are pressed with a small curved bar in two or three positions, by which the operator manages to make them all perfectly straight. They are now taken to the grinder, who sits in front of his grindstone upon a seat which is hollow, and forms an air-shaft open towards the stone; through this a blast of air is forced when the wheel is in motion, which carries away from the grinder every particle of the subtle dust from the needle points and the stone. Before this humane invention, which has rendered the operation quite innocuous, the loss of life in this manufacture was more serious than in any other industrial occupation. The operator, with great tact, holds about 25 of the wires, by means of his thumb, pressed against the inside of his fingers, the wires, which are held straight and applied to the grindstone, being dexterously turned round on the inside of the hand by means of the thumb, until they are ground sharp at one end; they are then reversed, and the other ends are similarly sharpened. They are next taken to the *impressing* machine, which in principle consists of a weight hanging to a block, which is raised by the hand and let fall at pleasure; the wires are placed in succession under this, so that the falling weight strikes each wire exactly in the middle, and there flattens it. The hardening of the flattened part by the blow is removed in the annealing oven, and the holes are next punched, two in each flattened portion. These are either done by hand-punches worked by children, who acquire great nicety in the operation, or by a machine on the same principle as the *impressing* machine; this not only punches the two holes, but also forms a small cross-cut between them, which is otherwise made by a file. At this cross-cut the wire is broken in two, and may now be regarded as two rudely-formed needles, each having a flattened and pierced head. A number of these are now threaded (*spitted*) on a thin wire, and are placed in a vice, which holds them firm and straight, so that the workman can file the heads on the top and sides, so as to remove all the barred edge. The next process is *oil tempering*, for which they are made hot, and immersed in efficient oil to coat them thoroughly; the oil is then burned off, an operation which renders the needles brittle. They are then weighed out into lots of about 500,000 each, and after being shaken so that they lie side by side, they are laid on a square piece of strong canvas, and a quantity of sand and emery-powder being mixed with them, they are corded up very securely into a long roll, from 13 inches to 2 feet in length. A number of these rolls or bundles are placed on a movable wooden slab, in the *scouring machine*, and over them is placed another heavily weighted slab. The action of the machine, of which these slabs form part, is to move them backwards and forwards in opposite directions, the bundles of needles acting as rollers, the pressure upon which works the enclosed needles, sand, &c., together, so that after eight to ten hours, which this operation occupies, instead of the blackened appearance they had when it commenced, they are white and

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silvery-looking. They are now removed to an exactly similar machine, where they are polished. Here they are separated from the sand and emery, and are removed to other canvas squares; and when mixed up with a paste of *putty-powder* and oil, are again corded up, and made to roll backwards and forwards under the weighted wooden slab of the *polishing machine* for four hours more. The next process is to remove them from the canvas, and agitate them in a vessel with soft-soap and water, to remove the oil and putty-powder, and next to dry them in ash-wood saw-dust. They are now highly polished and well tempered, but not all of exactly the same length, nor are the eyes perfect; they are therefore passed to a person who, by nice management of a small gauge, sorts them very quickly into certain lengths (*evening*), and arranges them all in one direction (*heading*). They then pass on to be drilled, an operation requiring great nicety, as the small oval holes have to be so polished all round, as not to cause any friction on the thread in sewing with them; a clever workman will drill and polish the holes of 70,000 needles per week. The needle is now practically finished, but many minor operations are considered necessary to produce high-finish; these we purposely omit, to avoid complicating our description. It is, however, worthy of remark, that this little instrument, which costs so much labor for its formation, has by these operations acquired immense value. The wire of which the ordinary-sized needles are made is so thin, that  $5\frac{1}{2}$  pounds go to form 74,000 needles. Of ordinary-sized needles,  $2\frac{1}{4}$  millions weigh 1 cwt., and are worth rather more than £200, although the steel wire of which they were made was only worth £14 at the commencement of the manufacture. English-made needles are the best in the world, and are chiefly made in Redditch and the neighborhood, where, and in other parts of the county of Worcester, this manufacture employs a large number of persons.

**NEEMU'CH**, or Nimach, a town of India, in the territory of Gwalior, (q v.), near the north-western border of Malwa, 320 miles south-west from Delhi, on a slightly-elevated ridge rising from a well-cultivated plain. It is 1476 feet above the sea. The native population of the town is only about 4000; but N. has acquired importance on account of a British cantonment established here in 1817. Prior to the sepoy mutiny of 1857—1859, the officers' quarters comprised about 80 bungalows, beautifully situated among gardens; but all, except a single bungalow, were destroyed in 1857 by the mutineers, who massacred the Europeans, and kept possession of the fort for some time, till it was captured by Brigadier Stuart, after a siege of fourteen days. The situation of N. is regarded as one of the most healthy in India; the climate is agreeable, the nights cool even in the hot season, the winter seldom so cold as to make fires requisite, and frost very rare.

**NEEM-TREE.** See **MELIACEÆ**.

**NEERWINDEN**, a small village of Belgium, in the north-west corner of the province of Liege, is celebrated in history for the great victory gained by the French under Luxembourg, over the English under William III. (29th July 1693); and also for the defeat of the French under Dumouriez by the allies under the Prince of Coburg (18th March 1793).

**NE EXEAT REGNO** is the title of a writ issued by the Court of Chancery to prevent an individual from leaving the kingdom, unless he gives security to abide a decree of that court. The writ was originally resorted to in cases of attempts against the safety of the state, but is now issued in cases where an equitable debt or demand is sought to be substantiated by a bill or proceeding in Chancery. The writ is only granted where the party usually resides within the jurisdiction. It resembles the process which is known in the common-law courts as arresting and holding to bail, and in Scotland as arresting a person in *meditatione fuge*.

**NEGAPATA'M**, a town of British India, in the presidency of Madras, and district of Tanjore, 124 miles south-south-west from Madras, on a small estuary of one of the many small southern mouths of the Cauvery. The manufacture of cotton and silk fabrics was, in former times, extensively carried on here, but has greatly declined in consequence of the cheapness of British goods. A chief branch of industry is the expression of oil from the cocoa-nut and from oil-seeds. There is a considerable trade with Ceylon. The harbor is suited only for small coasting-vessels; but measures are in progress for its improvement. N. is a terminus of the Great

Southern Railway of India. It was the capital of the Dutch possessions in India, but was taken by the British in 1781. Pop. (1871) 48,525.

**NEGATIVE**, in Photography, is that kind of photographic picture in which the lights and shadows of the natural object are transposed; the high lights being black, and the deep shadows transparent, or nearly so. Negatives are taken on glass and paper by various processes, and should indicate with extreme delicacy, and in reverse order, the various gradations of light and shade which occur in a landscape or portrait. A negative differs from a positive inasmuch as in the latter case it is required to produce a deposit of pure metallic silver to be viewed by *reflected light*; while in the latter, density to *transmitted light* is the chief desideratum; accordingly inorganic reducing and retarding agents are employed in the development of a positive, while those of organic origin are used in the production of a negative. Adopting the collodion process (which has almost completely replaced every other) as a type of the rest, the conditions best adapted for securing a good negative may be briefly indicated, leaving it to the reader to apply the principles involved to any process he may desire to practice.

The possession of a good lens and camera being taken for granted, and favorable conditions of well-directed light being secured, all that is necessary is to establish a proper and harmonious relation between the collodion bath, developer, and time of exposure. A recently-iodised collodion will generally be tolerably neutral, in which case, if the developer be at all strong, and the weather warm, the bath should be decidedly acid, or *fogging* will be the result. Should the collodion, however, be red with free iodine, a mere trace of acid in the bath will suffice, while the development may be much prolonged, even in warm weather, without fogging. If the simple fact be borne in mind that the presence of acid, either in the bath collodion or developer, retards the reducing action of the developer, it will suffice to guide the operator in many difficulties. The value of a negative consists in the power it gives of multiplying positive proofs. See **POSITIVE PRINTING**; also **PHOTOGRAPHY**.

**NEGATIVE QUANTITIES** are generally defined as quantities the opposite of "positive" or "numerical" quantities, and form the first and great point of difference between algebra as a separate science, and arithmetic. In the oldest treatises on algebra they are recognised as distinct modifications of quantity, and existing apart from, and independent of positive quantity. In later times, this opinion was vigorously combated by many mathematicians, among whom Vieta occupied a prominent place; but the more eminent analysts retained the old opinion. Newton and Euler distinctly assert the existence of negative quantities as quantities less than zero, and the latter supports his opinion by the well-known illustration of a man who has no property, and is £50 in debt, to whom £50 requires to be given in order that he may have nothing. After all, this discussion is little more than a verbal quibble, though interesting from the prominent position it for a long time held. It had its rise in the difficulty of satisfying the requirements of a constantly progressing science by the use of signs and forms retaining their original limited signification. It was soon felt that the limited interpretation must be given up; and accordingly an extension of signification was allowed to signs and modes of operation. + and —, which were formerly considered as merely symbols of the arithmetical operations of addition and subtraction, were now considered as "general cumulative symbols, the reverse of each other," and could signify gain and loss, upwards and downwards, right and left, same and opposite, to and from, &c. Applying this extended interpretation of signs to a quantity such as — 4, we obtain at once a true idea of a negative quantity; for if + 4 signifies 4 inches *above* a certain level, — 4 signifies 4 inches *below* that level, and therefore, though a positive quantity in itself (a negative being, strictly speaking, an impossible existence), it may be fairly considered to be less than zero, as it expresses a quantity less by 4 than 0 inches above the level. Keeping this idea in view, it has been conventionally agreed to admit the existence of negative quantities as existing *per se*. The only errors which can flow from this arise from misinterpretation of results for the four fundamental operations of addition, subtraction, multiplication, and division are unaffected by the extended interpretation of signs. The following is an illustration of the value of an extended interpretation of the negative sign, shewing at the same time how much more general are the ideas conveyed by algebraic expressions than

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by ordinary language: If at the present time a father is 50 years, and his son 20 years old, when will the father be three times as old as his son. This problem, when solved, gives — 5 as the number of years which must elapse before the father's age is three times the son's. Now, at first sight, this result appears to be absurd, but when we consider the terms of the problem, its explanation is easy. The question asked pointed to a number of years to *come*, and had the result turned out to be *positive*, such would have been the case, and the fact of its being negative directs us to look in a "contrary" direction, or backwards to time *past*; and this is found to satisfy the problem, as 5 years "ago" the father was 45 and his son 15.

Negative quantities arise out of the use of general symbols in subtraction, as in the formula  $a - b$ , where we may afterwards find that  $b$  is greater than  $a$ . See **Subtraction**.

**NEGRI'TOS**, or *Negrillos* (Spanish, diminutive of Negroes), is the name given by the Spaniards to certain negro-like tribes inhabiting the interior of some of the Philippine Islands, and differing essentially both in features and manners from the Malay inhabitants of the Eastern Archipelago. They bear a very strong resemblance to the negroes of Guinea, but are much smaller in size, averaging in height not more than four feet eight inches, whence their appellation of N., or little Negroes. They are also called by the Spaniards *Negritos del Monte*, from their inhabiting the mountainous districts for the most part; and one of the islands where they are most numerous, bears the name of *Isla de los Negros*. These N. are also known by the names Aeta, Aigta, Ite, Inapta, and Igolote or Igorote. They are described as a short, small, but well-made and active people, the lower part of the face projecting like that of the African Negroes, the hair either woolly or frizzled, and the complexion exceedingly dark, if not quite so black as that of the Negroes. The Spaniards describe them as less black and much less ugly than the negroes—*Menos Negros y menos feos*. All writers concur in speaking of them as sunk in the lowest depths of savagedom, wandering in the woods and mountains, without any fixed dwellings, and with only a strip of bark to cover their nakedness. Their only weapons are the bow and arrow; and they live upon roots, wild fruits, and any sort of animals that they can surprise in their haunts, or conquer in the chase. By the Malays, they are despised and hated; and the buffalo-hunters in the woods, when they meet with them, do not scruple to shoot them down like wild beasts or game. "It has not come to my knowledge," says a Spanish writer, "that a family of these Negroes ever took up their abode in a village. If the Mohammedan inhabitants make slaves of them, they will rather submit to be beaten to death than undergo any bodily fatigue, and it is impossible, either by force or persuasion, to bring them to labor." The same writer, an ecclesiastic, speaks of them as gentle and inoffensive in their manners, whenever he himself came in contact with them; and although informed that some of them were cannibals, he was not inclined to believe the report. Dr Carl Scherzer, the historian of the circumnavigation of the *Novara*, when at Manila, had an opportunity of seeing a Negrita girl whom he thus describes: "This was a girl of about twelve or fourteen years of age, of dwarf-like figure, with woolly hair, broad nostrils, but without the dark skin and wide everted lips which characterise the Negro type. This pleasing-looking, symmetrically-formed girl had been brought up in the house of a Spaniard, apparently with the pious object of rescuing her soul from heathenism. The poor little Negrilla hardly understood her own mother-tongue, besides a very little Tagal, so that we had considerable difficulty in understanding each other."

According to Spanish statements, the N. are found only in five of the Philippine Islands—namely, Luzon, Mindoro, Panay, Negros, and Mindanao—and are estimated at about 25,000 souls. Remnants of them exist, however, in the interior of some of the other islands in the Eastern Archipelago; and they are scattered, also, though in small numbers, through certain islands of Polynesia. They are altogether an island people, and are hence treated of by Prichard under the designation of Pelagian Negroes. By Dr Pickering they are treated of as a distinct race, resembling the Papuan, but differing from it in the diminutive stature, the general absence of a beard, the projecting of the lower part of the face or the inclined profile, and the exaggerated Negro features. The hair, also, is more woolly than that of the Papuan, though far from equalling that of the Negroes in knotty closeness. By Latham, the N. are classified under the subdivision of "Oceanic Mongoloid, C," which subdivi-

tion is further modified by him into the designation of "Amphibians" and "Kelenonesians." The N. out of the Philippine Islands are found for the most part in the islands embraced under the latter designation, as New Guinea, New Ireland, Solomon's Isles, Louisiade, New Caledonia, and Tasmania or Van Diemen's Land. Except in the last-mentioned island, however, the N. strictly speaking—that is, the blackish people with woolly hair—do not preponderate over the other native tribes less strongly marked with Negro features; while in Tasmania itself, the race has almost entirely disappeared, amounting at present to not more than two or three dozen souls. Dr Pickering is of opinion, that the Negrito race "once occupied more space than it does at this time, and that it has in many instances preceded the dissemination of other races." We conclude with a description of a Negrito native of Erromango (the island where the missionary Williams was murdered), supplied to Dr Pickering by Horatio Hales, his associate in the United States exploring expedition. "He was above five feet high," says Mr Hales, "slender and long limbed; he had close woolly hair, and retreating arched forehead, short and scanty eyebrows, and small snub nose, thick lips (especially the upper), a retreating chin, and that projection of the jaw and lower part of the face, which is one of the distinctive characteristics of the Negro race. . . . Placed in a crowd of African blacks, there was nothing about him by which he could have been distinguished from the rest." See PAPUANS and POLYNESIANS.

#### NEGRO, Rio. See RIO NEGRO.

NEGRO MINSTRELSY, a species of singing which originated among the negro slaves of the United States, and is now popular at public entertainments. The sentiment of the earlier of these negro melodies was of the most simple kind, the words mostly broken English, and the harmonies conflated chiefly to two chords—the tonic and dominant. How the airs were composed has been a matter of curious inquiry. Some of them are believed to be broken down and otherwise altered old psalm-tunes, which had been caught up by the more musical of the negro race. In some instances, the singing of the melodies is accompanied with grotesque gestures; the effect being to give the idea of good-nature and love of fun in the dark-skinned minstrels. Negro melodies may be said to have been made known by Mr D. Rice, who first in New York, in 1831, and afterwards in London, created a sensation by his singing of "Jim Crow." Other songs followed, such as "Jim along Josey," and "Buffalo Gals;" and from less to more, there was created a very characteristically national music, if the Americans will allow us to call it so. Becoming extensively popular and addressed to fashionable audiences, this negro minstrelsy now comprehends a large variety of songs, with airs of a pleasing kind, the whole much in advance of the original negro compositions. For these improvements, the world is indebted, among others, to Mr E. P. Christy, who began as conductor of a band of minstrels at Buffalo in 1843, and who established himself in New York in 1846. At first, his troupe were called the "Virginia Minstrels," but afterwards they were known as the "Christy Minstrels." Mr Christy's great success in this species of entertainment brought other leaders and troupes into the field. In most cases, the members of the negro minstrel troupes are only negroes in name, with faces and hands blackened for the purpose. See "Christy's Minstrels' New Songs, with Music," edited by J. Wade; and other similar collections.

NEGROES (from the Spanish word *negro*, black; Lat. *niger*) is the name given to a considerable branch of the human family, possessing certain physical characteristics, which distinguish it in a very marked degree from the other branches or varieties of mankind—more especially the so-called whites or Europeans. In Blumenbach's fivefold division of mankind, the Negroes occupy the first place under the variety *Ethiopian*, which likewise embraces the Kafirs, Hottentots, Australians, Afrikaners, and Oceanic Negroes. In Latham's threefold division, they are placed among the *Atlantides*, and form the primary subdivision of *Negro Atlantides* in that author's classification; while in Pickering's elevenfold division, they occupy the last place in his enumeration of the races of mankind.

Both Pritchard and Latham strongly protest against the common error of looking upon the term Negro as synonymous with African. "It ought to be remembered," says the former, "that the word Negro is not a national appellation, but denotes the ideal type constituted by the assemblage of certain physical char-

acteristics, which is exemplified in the natives of Guinea in Western Africa, and in their descendants in America and the West Indies." And Latham in like manner observes: "No fact is more necessary to be remembered, than the difference between the Negro and African; a fact which is well verified by reference to the map. Here the true Negro area—the area occupied by men of the black skin, thick lip, depressed nos., and woolly hair—is exceedingly small; as small in proportion to the rest of the continent, as the area of the district of the stunted Hyperboreans is in Asia, or that of the Laps in Europe. Without going so far as to maintain that a dark complexion is the exception rather than the rule in Africa, it may safely be said that the hue of the Arab, the Indian, and the Australian is the prevalent color. To realise this we may ask, what are the true Negro districts? and what those other than Negro? To the former belong the valleys of the Senegal, the Gambia, the Niger, and the intermediate rivers of the coast, parts of Soudania, and parts about Senaar, Kordofan, and Darfûr; to the latter, the whole coast of the Mediterranean, the Desert, the whole of the Kafir and Hottentot areas south of the line, Abyssinia, and the Middle and Lower Nile. This leaves but little for the typical Negro." Bearing in mind this limitation of the primitive area of the Negro, we shall next proceed to speak of his prominent physical characteristics.

The Negro has a black skin, unctuous and soft; woolly hair; thick lips; the lower part of the face prognathic, or projecting like a muzzle; the skull long and narrow; and a low, retreating forehead. The skull of the Negro is remarkably solid and thick, so that in fighting they often butt against each other like rams, without much damage to either combatant; and it is likewise so flat that barbed arrows are easily carried upon it. According to Camper's lateral admeasurement, the head of the Negro shows an angle of  $70^{\circ}$ , while that of the European shews one of  $80^{\circ}$ , on which difference of  $10^{\circ}$ , as he considered, depends the superior beauty of the latter. There is not much dependence, however, to be placed on such a mode of admeasurement; and the same may be said of Blumenbach's vertical method. According to this, a considerable difference would appear to exist between the skull of the Negro and that of the European. "But," says Dr Prichard, "I have carefully examined the situation of the foramen magnum in many Negro skulls: in all of them its position may be accurately described as being exactly behind the transverse line bisecting the antero-posterior diameter of the basis cranii. This is precisely the place which Owen has pointed out as the general position of the occipital hole in the human skull. In those Negro skulls which have the alveolar process very protuberant, the anterior half of the line above described is lengthened in a slight degree by this circumstance. If allowance is made for it, no difference is perceptible. The difference is in all instances extremely slight; and it is equally perceptible in heads belonging to other races of men, if we examine crania which have prominent upper jaws. If a line is let fall from the summit of the head at right angles with the plane of the basis, the occipital foramen will be found to be situated immediately behind it; and this is precisely the case in Negro and European heads." There is, in fact, neither in this respect—the conformation of the Negro skull—nor in any other, solid ground for the opinion harbored by some writers, and supported either through ignorance or from interested purposes, by many persons—that the Negro forms a connecting link between the higher order of apes and the rest of mankind. The difference is certainly considerable between the highest European and the typical Negro, but the gulf between them both and the highest of the Simiæ is so nearly of the same width, that the difference is scarcely distinguishable. But the skin, hair, skull, lips, maxillary profile, and general facial appearance of the Negro, are not the only features that distinguish him in a great degree from the European, and seem to stamp him as a distinct variety of the human race. "In the Negro," says Prichard, "the bones of the legs are bent outwards. Soemmering and Lawrence have observed that the tibia and fibula in the Negro are more convex in front than in Europeans; the calves of the legs are very high, so as to encroach upon the hams; the feet and hands, but particularly the former, are flat; and the os calcis, instead of being arched, is continued nearly in a straight line with the other bones of the foot, which is remarkably broad." As to the supposed excessive length of the forearm in the Negro, a circumstance also dwelt upon as shewing an approach to the anthropoid apes, facts are altogether against the state-

ment; there being no greater difference than is observable in individuals of any other variety of mankind. In stature, the Negro is very much on a par with the European, often reaching six feet, and rarely declining below five and a half. Into the discussion as to the cause of the blackness of the skin in the Negro we have not space to enter. It is generally supposed to depend upon the greater amount of pigment cells in the *Rele Malpighii*, and in the greater number of cutaneous glands, as compared with the skin of Europeans. In the skin of the Negro there is much oily matter, and he perspires profusely, which serves to keep him in health, while it diffuses a smell far from agreeable to bystanders whose olfactory nerves are at all sensitive. Of the hair of the Negro, Dr Pritchard remarks: "I am convinced that the Negro has hair properly so-called, and not wool. One difference between the hair of a Negro and that of a European, consists in the more curled and frizzled condition of the former. This, however, is only a difference in the degree of crispation, some European hair being likewise very crisp. Another difference is the greater quantity of coloring matter or pigment in the hair of the Negro. It is very probable that this quality is connected with the former, and is its cause, though we cannot determine in what manner one depends upon another; but as these properties vary simultaneously, and are in proportion one to another, we may infer that they do not depend upon independent causes."

The Negroes, in their native seat, comprise various independent tribes, which are thus classified and enumerated by Dr Latham: 1. *Western Negro Atlantida*, embracing the Woloffes, Sereres, Serawoll, Mandingoes, Felups, &c.; Fantis, &c.; the Ghâ, the Wadlâ, Malia and Beniu tribes, the Grebo, &c. 2. *Central Negro Atlantida*, embracing the Yarriba, the Tapua, Hausa, Fulahs, Cumbri, Sungui, Klesâr, Borinâ, &c.; Begharni, Mandara, Mobba, Furlans, Koldagi. 3. *Eastern Negro Atlantida*, embracing the Shillûk, &c.; Qamamyi, Dallâs, &c.; Tibboo, Gongas. This list might, of course, be still further enlarged by reference to the works of Barth, Livingstone, Speke, and other travellers, whose researches have been published since the appearance of Dr Latham's "Varieties of Man," in 1850.

While these several tribes have their distinctive peculiarities, they yet bear a strong general resemblance to each other, not only in their physical appearance, but in their intellectual capacities, moral instincts, customs, and manners. The Negro intellect is generally acknowledged to be inferior not only to the European, but to that of many primitive races not as yet brought within the pale of civilisation, while it is superior to that of the Australian, Bushmen, and Esquimaux. Some tribes are sunk in the lowest depths of barbarism, and are either ferocious savages, or stupid, sensual, and indolent. This is the case, for the most part, according to Pritchard, where the exaggerated Negro type is discernible, as among the Bulloms, Papals, and other tribes on the coast of Western Guinea; also among the tribes near the slave coast, and in the Bight of Benin, where the slave trade has been carried on to the greatest extent. In other parts they shew a capacity for practising the arts of life. They are ingenious in the construction of their dwellings, they have some knowledge of the working of iron and other metals, they manufacture arms, dress and prepare the skins of animals, weave cloth, and fabricate numerous useful household utensils. Neither are they altogether deficient in a knowledge of agriculture. These marks of civilisation are, for the most part, apparent in the districts either wholly or partially converted to Mohammedanism. Mungo Park, in his account of Sego, the capital of Bambarra, describes it as a city of 80,000 inhabitants, with houses of two stories high, having flat roofs, mosques in every quarter, and ferries conveying men and horses over the Niger. "The view of this extensive city," he says, "the numerous canoes upon the river, the crowded population, and the cultivated state of the surrounding country, formed altogether a prospect of civilization and magnificence which I little expected to find in the bosom of Africa." All tribes of negroes appear to be passionately fond of music, and shew no little skill in the manufacture of musical instruments. They also express their hopes and fears in extemporary songs. Where Mohammedanism has not been introduced, the religion of the negroes is nothing but a debased *fetish* worship. They make fetiches of serpents, elephants' teeth, tigers' claws, and other parts of animals, at the dictation of their *fetish man*, or priest. They also manufacture idols of wood and stone, which they worship; and yet, under all this, they have some idea of a Supreme being. They believe in good and evil spirits,



and are perpetually practising incantations to ward off the baneful influence of their spiritual enemies. Their religion, in fact, is one altogether of fear; and as this generally leads to cruelty, we find them for the most part indifferent to the sacrifice of human life. In some parts they even offer up human victims to propitiate their deities. They are cruel to their enemies and prisoners, and often shed blood for the mere savage delight they experience in seeing it flow from their victims. We need only allude to the inhuman customs, as they are called, of Dahomey, and the *Yam and Adai customs* of the Ashantees, as described by Bowdich, in support of this statement.

This same indifference to human suffering, coupled with the passion of avarice, has doubtless been the mainspring of the slave-trade, carried on during so many centuries between the Negroes and European traders in the western coast of Africa. Begun by the Portuguese as early as 1508, when negro slaves were first imported into the West Indies, sanctioned by Ferdinand of Aragon in 1511, and subsequently by Charles V., legalized in England under Elizabeth, and eventually practised by every maritime nation of Europe, this infamous trade flourished under the sanction of law as late as the year 1807, when it was happily abolished by act of Parliament in Great Britain, and is now treated as piracy by almost every civilized nation. Even still, however, it is practised by lawless men, notwithstanding the humane efforts of Great Britain, France, and the United States to suppress it; and the encouragement which it has given to the petty chieftains on the slave coast, and the country behind it, to enrich themselves at the expense of their fellow-countrymen, has contributed more than anything else to retard the progress of civilisation in that part of Africa. "The region mentioned," says Pritchard, "has been the great seat of the exportation of Negro slaves, and the tribes on the coast have been reduced to the lowest state of physical and moral degradation by the calamities and vices attendant on that traffic. Throughout Negroland, and especially this part of it, the inhabitants of one district in the interior, the dwellers on one mountain, are ever on the watch to seize the wives and children of the neighboring clans, and to sell them to strangers; many sell their own. Every recess, and almost every retired corner of the land, has been the scene of hateful rapine and slaughter, not to be excused or palliated by the spirit of warfare, but perpetrated in cold blood, and for the love of gain."

The custom of polygamy prevails among all the Negro tribes, and where there are constituted into nations or kingdoms, as in Dahomey, the sovereign has often as many as two or three thousand wives, whom he occasionally disposes of as presents to his chief officers and favorites.

The languages of the various nations and tribes of Negroes are very numerous. Vocabularies of nearly 200 languages have been brought from Africa by the Rev. Dr Koelle. "A slight examination of these vocabularies," says Mr Edwin Norris, "seems to shew that there are among the Negro idioms a dozen or more classes of languages, differing from each other at least as much as the more remote Indo-Germanic languages do." To these Negro idioms Dr Krapf has given the name of *Nigro-Hamitic Languages*. These may perhaps have affinities with some of the other African tongues, but not with any of the great well-defined families of languages. For further information upon this subject, we must content ourselves with referring to Dr Pritchard's "Natural History of Man," and especially to a learned note by Mr Edwin Norris, in vol. i. of that work, page 323.

Of the condition and prospects of the Negroes in the various countries into which they have been imported during the prevalence of the slave-trade, we have scarcely room to speak. They are found in all the West India Islands, to the number of about 3,000,000; in the United States, Brazil, Peru, and other parts of South America; also in the Cape de Verde Islands, Arabia, Morocco, &c. In the British West India Islands they were emancipated from slavery in 1834, and in those belonging to France in 1848. Indeed, slavery now exists nowhere in the West Indies, with the single exception of Cuba. In the United States, the Negroes amounted in 1870 to 4,890,000. Many of these were emancipated in the course of the late unhappy civil war, all the Negroes of Secession masters being declared emancipated by proclamation of President Lincoln and act of the Federal congress; at the same time that indemnities were promised to such loyal states as of their own accord decreed emancipation. Negro slavery in the United States has been

utterly destroyed, and the great problem which used to exercise philanthropic minds, has been solved—the Negro having become a United States citizen at a fearful cost of blood and treasure to both their possessors and their liberators.

NEGROPONT. See EUBŒA.

NEGROS, *Isla de*. See PHILIPPINE ISLANDS.

NEGU'NDO, a genus of trees of the natural order *Aceraceæ* (see MAPLE), differing from the maples chiefly in the diœcious flowers being destitute of petals, and in the pinnated ash-like leaves. The COMMON N. or ASH-LEAVED MAPLE, is a native of North America, and not now unfrequent in Britain as an ornamental tree.

NEGUS, a compound of either port or sherry wine and hot water sweetened with sugar and flavored with lemon-peel and spices. It is a favorite beverage in England, and derives its name from a Colonel Negus, who claimed to be the inventor.

NEHEMI'AH, son of Hachaliah, probably of royal descent, is first mentioned in the Bible as cupbearer to Artaxerxes Longimanus in his palace at Shushan about 444 a.c. Having learned the sad fate of the returned colonists in Jerusalem, he prevailed upon the king to send him to his brethren there with full powers "to seek their welfare." For twelve years (444–432) he was untiringly engaged as "Governor" in works for their safety from within and without: refortifying the city walls, notwithstanding the hindrances and dangers that beset him on all sides; inducing people from the country to take up their permanent abode in the city, thus promoting its prosperity; and finally, and above all, rekindling the flame of ancient piety and the enthusiasm for the observance of the Law in the hearts of the rough immigrants. He then returned to Persia, trusting to the new vitality which his reforms had, as he thought, infused into the Jewish commonwealth. But not long afterwards—within a period which it is extremely difficult now to fix—he had again to obtain leave from the king, for the purpose of abolishing the many abuses that had crept in during his brief absence from Jerusalem. His energies now were chiefly directed against the foreign elements mixed up with the people, both privately and publicly. He enforced the rigorous observance of Feast and Sabbath, and rearranged the Temple service in accordance with its primeval purity, procuring at the same time the means for its proper support by inducing the people to offer the tithes as of old. His second stay at Jerusalem seems to have lasted between ten and fifteen years; but the dates, as gathered from circumstantial evidence only, are exceedingly vague. He seems to have lived to an old age, but the place and year of his death are unknown. What was the part he took in the formation and redaction of the biblical canon, cannot be investigated in this place. But there can hardly be a doubt, that among the reformatory works undertaken by him, the collection, and perhaps the edition of some of the books of the Old Testament must be included.

The Book known under his name (in 18 chapters) is believed only partly his own work. Recent investigation ascribes to him only the first six chapters, part of the seventh, and the last chapter and a half; the rest being a compilation by other hands. Its style and character are very simple, free from anything supernatural or prophetic. Its language resembles much that of Chronicles and Ezra, and is replete with Aramaisms and other foreign, partly Persian words. Originally considered a mere continuation of the Book of Ezra, it was by the Greeks and Latins at first called "The Second Book of Ezra." Gradually, however, it assumed its present independent position in the canon after Ezra. It is supposed to have been written or compiled towards the end of N.'s life.

NEILGHERRY (properly Nilgiri) Hills (Skr. *nila*, blue, and *giri*, mountain), a remarkable group of mountains in the south of Hindustan, entirely isolated, with the exception of a precipitous granite ridge, 15 miles in width, which connects it with the high table-land of Malsur on the north. Lat. 11° 10'–11° 38' n., long. 76° 20'–77° 10'. The shape of the group is that of a triangle, of which one side faces the district of Malabar on the west. Greatest length, about 40 miles; average breadth, about 15 miles. The base of the mountains is covered by a dense and unhealthy forest, swarming with wild animals, among which are the elephant and tiger; but in the higher regions of the Hills, wood is comparatively scanty. The surface of the group is undulating, rising, in the peak of Doddabetta, near the centre, to the height of 8760 feet, the greatest height, as yet ascertained, in India, south of

Neigherry  
Neison

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the Himalayas. The Hills for the most part consist of granite, covered often to the depth of upwards of ten feet by a richly productive black soil. There are several morasses yielding peat, which is used for fuel. The higher lands form a fine open grass country, covered with the vegetation of the temperate zone, and inhabited by a most remarkable tribe, the *Tudas* or *Torwars* (herdsmen). This tribe numbers only about 2000 persons. The men are tall and handsome, with Roman noses, fine teeth, and large expressive eyes; the women are singularly beautiful. Their religion is Theism; they have no idols. Owing to their great elevation, the N. H. have a delightfully cool climate, and are much resorted to on this account by inviolated Europeans. The principal station, and the only place on the Hills that deserves the name of a town, is Utakamand, situated in the centre of the Hills, at an elevation of 7800 feet above sea-level. Its climate is cold and damp during the monsoon; at other times it is intensely dry, and the mean annual temperature is 68°.

**NEIGHERRY NETTLE** (*Girardinia Laschenaultii*), a plant of the natural order *Urticæ*, nearly allied to the true nettles, and possessing in a high degree the stinging power which is common in them. It is frequent on all the higher ranges of the Neigherry Hills. The bark yields a valuable fibre, which the natives obtain by first boiling the whole plant, to destroy its stinging properties, and then peeling the stalks. The fibre is of great delicacy and strength, and is worth £200 a ton in England. The cultivation of the plant is therefore thought likely to be remunerative.—Markham's "Travels."

**NEIRA.** See **MOLUCCAS.**

**NEISSÉ,** a town of Prussian Silesia, and a fortress of the second rank, is situated in a broad valley on the Neisse, an affluent of the Oder, 30 miles south-west of Oppeln. It consists of the town proper on the right bank, of the Friedrich's Town, and of the Prenssee Fort on the left bank. It contains two great squares, has eight Catholic and two Evangelical churches, a hospital, theatre, &c. It carries on manufactures of arms, chemical products, and tobacco, and establishments for spinning and weaving are in operation. The entire population in 1871 was 19,376. N. formerly the chief town of a principality of the same name, and the residence of a prince-bishop, has frequently been the scene of conflict.

**NELLORE,** a town of British India, capital of a district of the same name, in the presidency of Madras, situated on an elevation on the right bank of the Northern Pennar, 20 miles from its mouth, and 95 miles north-north-west from Madras. It is irregularly built, and the population in some places much crowded; but there are some good streets. The abundant supply of water contributes to the health of the town. N. was formerly an important fortress. It is a curious circumstance that, in the end of last century, a pot filled with Roman gold coins and medals—chiefly of Trajan, Adrian, and Faustina—was found under the ruins of a small Hindu temple at Nellore. Pop. 30,000.

**NEJIN,** an ancient town of Little Russia, in the government of Tchernigof, on the Oster, an affluent of the Dnieper, about 80 miles north-east of Kiev. It fell into the hands of the Lithuanians in 1320, and of the Poles in 1386, but was annexed to Russia in 1654. N. is an industrious town of (1867) 20,516 inhabitants, many of whom are descendants of Greek immigrants who settled here in the reign of Catherine II. The principal branch of industry is the cultivation of tobacco. Great quantities of leaf-tobacco are sent hence to St Petersburg, Riga, and Mittau. The chief institutions are two monasteries, 25 churches, and a lyceum.

**NELSON,** Horatio, the greatest of Britain's admirals, was born on the 29th September 1758, at Burnham Thorpe, Norfolk, of which place his father, Edmund Nelson, was rector. His mother's maiden name was Sackling, and through her he could claim a collateral kinship with the celebrated Sir Robert Walpole. As a child, he was feeble and sickly; and throughout life his small, frail, and attenuated frame seemed to consort but poorly with the daring and impetuous spirit which "stirred and lifted him to high attempts." At the age of 13, he entered the royal navy, commencing his career in the *Raisonnable*, 64 guns, commanded by his uncle, Captain Sackling. Then, even more than now, promotion in the first stages of the profession was determined by Admiralty interest; and fortunately for him and for England, his uncle, shortly afterwards becoming comptroller of the navy, was able to facilitate his

rise. His promotion was nearly as rapid as it could be, and before he was quite 21, he had attained the rank of post-captain, which fairly opened the way for him to the higher honors of the service. Up to this time, no opportunity had been afforded him of achieving any marked distinction, but to all who were brought into contact with him, he had already approved himself a bold and capable officer. Henceforward, for some years, he was nearly constantly employed in a variety of harassing services; and in all his conduct was such, that in no long time he had made for himself a brilliant reputation. His growing fame was as yet, however, chiefly confined to professional circles, no very signal exploit having brought his name prominently before the public. But with the advent of the war with revolutionary France, the time had come when he was to "flame amazement" on the world by a series of noble deeds, in the lustre of which all other naval glory looks pale. In his obscurer years, he seems to have been cheered under what pained him as unmerited neglect by that prescience of a grand destiny, which has so often preluded to a career of exceptional splendor. Thus, on one occasion, he writes: "They have not done me justice. But never mind. One day I'll have a gazette of my own." And subsequently the same confidence is expressed with something like the depth of a religious conviction: "One day or other I will have a long gazette to myself. I feel that such an opportunity will be given me. I cannot, if I am in the field of glory, be kept out of sight; wherever there is anything to be done, *there Providence is sure to direct my steps.*" In 1793, appointed to the *Agamemnon*, 64 guns, he took a distinguished part, among other services, in the sieges of Bastia and Calvi, in Corsica, losing an eye at the last of these; and in the celebrated action of Sir John Jervis off Cape St. Vincent with the Spanish fleet, to a manoeuvre of extreme and masterly daring, executed by Nelson in defiance of orders, that officer was mainly indebted for the splendid success obtained and the peerage with which it was rewarded. Though in the interval an expedition which he commanded against Teneriffe had failed disastrously, with loss to himself of his right arm in the assault, it was on all hands admitted that everything was done on the occasion which skill and valor in their highest combination could effect, and N., on his return to England in 1797, was received with general acclamation. He was invested with the Order of the Bath, and a pension of £1000 a year was voted to him. Being next year intrusted with a fleet, he signalled this his first independent command of any magnitude by the stupendous victory of the Nile, memorable in naval annals as the completest annihilation of an enemy on record. See *ABOUKIR*. Finding the French fleet—to which his own was considerably inferior in force—skillfully moored so as to defy ordinary attack, he adopted the novel expedient of doubling on the enemy's ships, and was rewarded with success the most consummate. Of the French line of battle, two ships only escaped to be afterward captured; and it was considered that solely to a wound in the head, which in the heat of the action prostrated N., did even these owe their temporary safety. Honors were now from all quarters showered upon him; and in particular the gratitude and enthusiasm of his countrymen were signified by the title bestowed on him of Baron Nelson of the Nile, and a grant of £2000 a year for his own life, and the lives of his two immediate successors. For his services immediately subsequent, in effecting the expulsion of the French from Naples, the Neapolitan king rewarded him with the Dukedom of Bronte and a domain of £3000 a year. These last honors, however, were in one sense dearly purchased. The single suspicion of a blot on his public fame is in regard of his relations with the corrupt court of Naples, and of certain questionable acts into which by these he was led. The only flaw in his private character was his infatuated attachment to Lady Hamilton, the wife of the English ambassador, a woman of questionable antecedents, but perilsous fascination, with whom he was here thrown in contact. The influence which she now obtained over him, she continued to the end to exercise. Early in life he had married, and married happily. If to the charms of an impure adventure he sacrificed, on his return to England, the wife to whom before he had been tenderly devoted, it is not necessary to indulge in comment. Let us compassionate the one cruel frailty of a man in all else and in his proper nature, as gentle and generous as he was brave.

His next magnificent exploit was the battle of Copenhagen in 1801, in which, after a struggle of terrible severity, he shattered the naval power of Denmark, and

Nelson  
Nemes

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along with it the dreaded coalition against England of the three northern kingdoms. Never were the characteristic and heroic qualities of the man more brilliantly displayed than on this most trying occasion. In the moral courage to accept responsibility at all hazards, no man ever surpassed him. In the heat of the battle, his chief, Sir Hyde Parker, in deadly anxiety as to the issue of what at a distance seemed to be a hopeless conflict, signalled him to discontinue action. "Damn the signal!" said N., when this was reported to him. "*Keep mine for closer battle flying.*" That's the way I answer such signals. Nail mine to the mast." And with the certainty of professional disgrace and ruin staring him in the face in case of failure, he worked out his grand triumph.

Had N.'s services here ceased, his fame would still have been assured as the greatest of England's naval heroes. But a crowning glory awaited him. In the earlier part of 1805, glowing with fierce ardor and impatience, he had chased half round the world a French fleet of nearly double the force of his own, scared by the very terror of his name; and on the morning of the memorable 21st October of that year, the desire of his eyes was satisfied, when in the Bay of Trafalgar he saw before him the combined navies of France and Spain moving to meet him in frank fight. Of the glorious consummation which followed, we need not speak in detail. Ere night, the power of France upon the seas was annihilated, and her threatened invasion of England had become an abortive dream. But N. was no more. He died as such men wish to die, amid the thunders of his mightiest victory.

The character of M. was, for a man of his greatness, unusually simple and transparent. A more absolute singleness of aim and aspiration than his, it is difficult even to conceive of. Literally on fire with that ardor and passion of enthusiasm, without some tincture of which scarce any man perhaps has ever yet achieved distinction, he was driven by it imperiously in one direction. The greatest of sailors—he was a sailor and little else. Of his genius for command, it would be idle at large to speak. In coolness, foresight, promptitude, instant intuitive decision, and a daring which, even when it seemed at times to touch temerity, was yet regulated throughout by the nicest calculations of reason, he has perhaps never been quite equalled on the element. His nature was most noble and humane. His heart was as soft as a woman's, and overflowed with all liberal generousities. He had but to be known to be beloved; and of the tender chivalry of his relations with his gallant brethren in arms, it is touching to read.

NE'LSON, the capital of a province of the same name, in New Zealand, is situated at the north end of South Island, at the mouth of the Maitai, a small river, and at the head of a large bay called Blind Bay. The situation is very beautiful, on a flat, hemmed in by rugged hills, and amidst almost tropical luxuriance. The harbor, however, only admits vessels of 500 tons at high water, and this circumstance has much retarded the progress both of the town and the settlement. The centre of the town is a hill rising 40 feet above the surrounding streets, and laid out as a square with an Episcopal church in its centre. N. is the seat of a bishop. The city was founded in 1841. The population in 1871 was 5584. Three newspapers are published here. The manufactures of the town comprise cloth and leather. Steamers sail to the neighboring ports.

NELU'MBO (*Nelumbium*), a genus of aquatic plants similar to Water Lilies, and often included under that name, as well as by some botanists in the natural order *Nymphæaceæ* (q. v.); although by others constituted into a distinct order, *Nelumbiaceæ*, differing in the want of albumen in the seed, and in the distinct carpels, which are one-seeded, and buried in the cavities of a large fleshy receptacle; which eventually becomes a broad hard bed, full of holes, with the large seeds half buried in them. The flowers and leaves are very similar to those of water-lilies. The species are few, and are found in the warm parts of Asia, in the north of Africa, and in North America. They are all distinguished by the beauty of their flowers. *N. speciosum* is the EGYPTIAN BEAN of Pythagoras, the *Lotus* (q. v.) of the Hindus, held sacred by them and by the people of Thibet. It is also much esteemed and cultivated in China, and elsewhere in the East, for its seeds, roots, leaf-stalks, and flower-stalks, all of which are eaten. It has been used as food by the Egyptians from remote antiquity. The seeds are in size and shape like acorns, with a taste more delicate than that of almonds. The root contains much starch, and Chinese arrow-root

is said to be obtained from it. Slices of it are often served up at table in China. Great quantities are pickled with salt and vinegar, and eaten with rice. The powdered root makes excellent soup with water or milk. The flowers are generally rose-colored, seldom white. The ancient Egyptian mode of sowing this plant, by enclosing each seed in a ball of clay, and throwing it into the water, is practised at the present day in India.—*N. luteum* is a North American species, extending almost as far north as Philadelphia; with yellow flowers. The seeds are sought after by children and by Indians, and the farinaceous roots are agreeable when boiled.

**NEMATHELMIA** (derived from the Gr. words *nema*, a thread, and *helmins*, an intestinal worm) is the term given by recent zoologists to a large and important class of the subdivision *Vermes* of the *Articulata*. The worms belonging to this class are of a more or less elongated cylindrical form. Their skin is thick and strong, and is usually wrinkled in such a manner as to give the body an annulated appearance, which, however, disappears if the animal is placed in water. The nervous system in the higher forms (as the *Ascarida*) consists of two lateral ganglia at the anterior extremity, which are united by a slender nervous ring, and from which two lateral nervous trunks proceed to the posterior part of the body; while in the lower forms no distinct nervous system can be recognised. No special organs of the senses are met with; but a general sense of touch is probably present. The digestive organs are extremely simple. In one order (the *Acanthocephala*), no trace of an intestinal canal can be detected; in another order (the *Gordiacea*) there is a mouth, but no anus; while the higher forms are provided with mouth, intestinal canal, and anus. In the higher forms, a kind of vascular system is developed in the skin, in the shape of canals, in which the nutrient fluid is propelled by the movements of the body. No distinct respiratory organs can be detected; but in some genera there are glands whose object is not clearly known. These worms are unisexual; but the males are comparatively rarely found, and are always smaller than the females. With the exception of two families—the *Urolabea* and *Anguillulidae*, or paste and vinegar eels—all the animals of this class are parasitic; indeed, Carus, in his "Handbuch der Zoologie" (1863), vol. ii. p. 468, goes so far as to say that "probably all the nematelmia live as parasites, either during their whole lives or during certain stages of their existence."

The *N.* are sometimes termed *Round-worms*, just as the *Platyelmia* (tape-worms, flukes, &c.) are called *Flat-worms*. Most commonly, however, the term *round-worm* is restricted to the *Ascaris lumbricoides*, the most common of the human entozoa.

This class is divisible into three very distinct orders—viz., the *Acanthocephala*, which are destitute of an intestinal canal; the *Gordiacea*, which possess an intestinal canal, but no anus; and the *Nematoidea*, which possess a perfect intestinal canal, provided with two orifices.

**NEMATODEA** constitute the highest order of the *Nematelmia*, and indeed of intestinal worms generally, inasmuch as they present a distinct nervous system, a complete intestine provided with mouth and anus, and distinct sexual organs. The history of their development is not fully known; but there is no reason to believe that these animals undergo any remarkable metamorphoses, although some perforate the intestinal walls and become encysted in parenchymatous organs. The great majority of the *N.* are parasitic. The *N.* are divided by Carus into twelve families, all the members of which are known only in a parasitic state of existence, excepting certain genera of the first and second family.

Although the intestinal canal is the most common residence of these worms, some as *Trichina spiralis*, are found chiefly in the muscles; others, as *Filaria medinensis*, in the subcutaneous cellular tissue; and others in the kidneys, lungs, &c. See **ENTROZOA**. For further information regarding these worms, the reader is referred to Eberth's "Untersuchungen über Nematoden" (4to, 1863).

**NE'MĒA**, anciently the name of a deep and well-watered valley of Argolis, in the Peloponnesus, between Cleonæ and Phlius. It lies north and south, and is from two to three miles long, and more than half a mile broad. It possessed a sacred grove, with a magnificent temple of Zeus, and was celebrated for the games called the *Nemean Games*, which took place four times in two Olympiads in an adjacent woody valley. This was one of the great national festivals of the Greeks, and, according to one legend, was founded by the seven princes who were combined against Thebes;

**Nemertes**  
Neo

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according to another, by Hercules after his victory over the Nemean Lion. The games consisted partly of exercises of bodily skill and strength—such as chariot-racing, quoit-throwing, wrestling, running in armor, horse-racing, boxing, throwing the spear, and archery, and partly of musical and poetical competitions. The prize was originally a crown of olive twigs, afterwards of parsley. We have eleven odes by Pindar in honor of victors in the Nemean Games.

**NEMERTES**, a genus of marine *Annelida*, the type of a family, *Nemertidae*, remarkable for the prodigious length which some of the species attain, which, in their most extended state, is 30 or 40 feet. But the animal which stretches itself out to this length, is capable of suddenly contracting itself to three or four feet. The structure is similar to that of leeches, but there is no sucker. These annelids feed upon molluscs by sucking them out of their shells. They generally lurk in the mud or sand of the sea-coast, and are sometimes drawn up with the nets or lines of fishermen. They twine themselves into knots and coils, apparently inextricable, but without any real entanglement. The life-history of the *Nemertidae* is curious. The embryo has at first a ciliated, non-contractile, oval body; from which there issues a small actively contractile worm, leaving behind it the oval skin, and this worm grows to the size already mentioned. The larval state, however, exhibits a cleft with raised edges, which becomes the mouth of the perfect animal.

**NEMESIS**, according to Hesiod, the daughter of Night, was originally the personification of the moral feeling of right and a just fear of criminal actions—in other words of the conscience. Afterwards, when an enlarged experience convinced men that a Divine will found room for its activity amid the little occurrences of human life, N. came to be regarded as the power who constantly preserves or restores the moral equilibrium of earthly affairs—preventing mortals from reaching that excessive prosperity which would lead them to forget the reverence due to the immortal gods, or visiting them with wholesome calamities in the midst of their happiness. Hence originated the latest and loftiest conception of N., as the being to whom was intrusted the execution of the decrees of a strict retributive providence—the awful and mysterious avenger of wrong, who punishes and humbles haughty evildoers in particular. N. was thus regarded as allied to Atë (q. v.), and the Eumenides (q. v.). She was sometimes called Adrastea and Rhamnusia, the latter designation being derived from Rhamnus, a village of Attica, where she had a temple. She was represented in the older times as a young virgin, resembling Venus; in later times, as clothed with the tunic and peplos, sometimes with swords in her hands and a wheel at her foot, a griffin also having his right paw upon the wheel; sometimes in a chariot drawn by griffins. N. is a frequent figure on coins and gems.

**NE'NAGH**, a market town of Tipperary county, Ireland, distant 95 miles southwest from Dublin; pop. (1871) 5696, of whom the Roman Catholics were twelve times as many as the Protestants of the Episcopalian Church, and there were fifty or sixty Protestants of other denominations. N. is the assize town of the North Riding of Tipperary, and is a place of more than ordinary pretensions in its public buildings. The ancient keep, called Nenagh Round, is a striking object, and the court-house, jail, barrack, and union workhouse are imposing edifices. There is a free school, and three national schools. Among the not very numerous articles manufactured at N., are woollens, tobacco, soap and candles. It is, however, a place of very considerable inland trade.

**NE'OPHYTE** (Gr. *neophytos*, from *neos*, new, and *phuo*, to grow), the name given in early ecclesiastical language to persons recently converted to Christianity. The word is used in this sense by St Paul (1 Tim. iii. 6), and is explained by St Gregory the Great as an allusion to "their being newly planted in the faith" (Epp. b. v. ep. 51). It differed from Catechumen (q. v.), inasmuch as it supposed the person to have not only embraced the doctrines of the church, but also to have received baptism. St Paul, in the passage referred to, directs Timothy not to promote a neophyte to the episcopate; and this prohibition was generally maintained, although occasionally disregarded in very extraordinary circumstances, such as those of St Ambrose (q. v.). The duration of this exclusion was left for a time to the discretion of bishops; but several of the ancient synods legislated regarding it. The third council of Arles, 524, and the third of Orange in 528, fix a year as the least limit of probation. In the modern Roman Catholic Church the same discipline is

observed, and extends to persons converted not alone from heathenism, but from any sect of Christians separated from the communion of Rome. The time, however, is left to be determined by circumstances. The name neophyte is also applied in Roman usage to *newly-ordained priests*, and sometimes, though more rarely, to the *novices* of a religious order.

**NEO-PLATONISTS**, the name given to an illustrious succession of ancient philosophers who claimed to found their doctrines and speculations on those of Plato. Strictly speaking, however, the Platonic philosophy—that is, in its original and genuine form—expired with Plato's immediate disciples, Speusippus and Xenocrates. Arcesilaus (q. v.), the founder of the New Academy, and at a later period Carneades (q. v.), introduced and diffused a sceptical *Probabilism*, which gradually destroyed that earnest and reverent spirit of intellectual inquiry so characteristic of the great pupil of Socrates. The course of political events in the ancient world also largely assisted in bringing about the same result. The triumphs of the Roman power had been accomplished at the expense of national liberties, and had issued in a general deterioration of moral character, both in the East and the West. Public men, especially, sought, above all things, material gratifications, and came to look upon philosophy itself as only a more exquisite kind of luxury. It was quite natural, therefore, that Scepticism and Eclecticism should become the prevalent forms of philosophy. Besides, the speculations of the older philosophers were felt to be unsatisfactory. When men began to review the long succession of contradictory or divergent systems that had prevailed since the time of Thales the Milesian, in the gray dawn of Greek history, a suspicion appears to have sprung up that reality, certainty, truth, was either not attainable, or could only be attained by selecting something from every system. Moreover, the immensely extended intercourse of nations, itself a result of Roman conquest, had brought into the closest proximity a crowd of conflicting opinions, beliefs, and practices, which could not help occasionally undergoing a confused amalgamation, and in this way presented to view a practical eclecticism, less refined and philosophical indeed than the speculative systems of the day, but not essentially different from them. This tendency to amalgamation shewed itself most prominently in Alexandria. Placed at the junction of two continents, Asia and Africa, and close to the most cultivated and intellectual regions of Europe, that celebrated city naturally became a focus for the chief religions and philosophies of the ancient world. Here, the East, and the West, Greek culture and Oriental enthusiasm, met and mingled; and here, too, Christianity sought a home, and strove to quell by the liberality of its sympathies, the myriad discords of Paganism. "Greek Scepticism," says Mr Lewes, "Judaism, Platonism, Christianity—all had their interpreters within a small distance of the temple of Serapis." It is not wonderful, therefore, that a philosophy, which so distinctly combines the peculiar mental characteristics of the East and the West, as that promulgated by the Neo-Platonists, should have originated in Alexandria. Yet, at the same time, it is but right to notice, as does M. Matter in his "*Histoire de l'Ecole d'Alexandrie*," that it soon ceased to have any local connection with the city. Its most illustrious representatives were neither natives of Alexandria, nor members of the famous Museum, and they had their schools elsewhere—in Rome, in Athens, and in Asia.

It is not easy to say with whom *Neo-Platonism* commenced. Scholars differ as to how much should be included under that term. By some it is used to designate the whole new intellectual movement proceeding from Alexandria, comprising, in this broad view, the philosophy, 1st, of Philo-Judæus and of Numenius the Syrian; 2d, of the Christian Fathers (Clement Alexandrinus, Origen, &c.); 3d, of the Gnostics; and 4th, of Ammonius Saccas and his successors. Others, again, would exclude the second of these (though the Alexandrian divines frequently Platonise); while a third party is disposed to restrict the application of the term to the fourth. The last of these modes of regarding Neo-Platonism is the one most current, and is perhaps the most convenient and definite; yet Bouterwek, Tennemann, Lewes, &c., agree in considering Philo-Judæus (q. v.), an Alexandrian Jew, and (in part) contemporary of Jesus Christ, as the first of the Neo-Platonists—that is to say, as the first who endeavored to unite the mysteries of Oriental belief with the dialectics and speculations of the Platonists. A similar course was at least partially pursued by the Christian fathers of Alexandria, partly from a predilection for the philoso-



phy in which they had been reared, and partly from a desire to harmonise reason and faith, and to make their religion acceptable to thoughtful and educated pagans; hence, they too may, not without reason, be classed along with Philo, though their spirit and aim are distinctively and even strongly Christian. In Gnosticism, on the other hand, speaking generally, the lawless mysticism of the East predominated, and we see little either of the spirit or logic of Plato. They may therefore be dismissed from the category of Neo-Platonists. Regarding Philo-Judeus and the Alexandrian divines, it must be noticed that they wrote and taught in the interests of their own religion, and had no idea of defending or propagating a heathen philosophy. It is this which strikingly distinguishes them from the school founded by Ammonius Saccas, and also from an independent group of pagan teachers and authors who likewise flourished in the first and second centuries after Christ, and whose main object was to popularise and diffuse the ethics and religious-philosophic system of Plato, by allegorically explaining the ancient mysteries of the popular belief in harmony with the ideas of their master, but, at the same time, blending with these many Pythagorean and Aristotelian notions. The best-known names of this group are Plutarch (q. v.) and Appuleius (q. v.). These men have a better claim to the title of Neo-Platonists than any of the others. They adhered far more closely to their great master, and were, in fact—to the best of their ability—simply popular exponents of his philosophy. Living at a time when paganism was in a moribund condition, they sought to revive, purify, and elevate the faith in which their fathers had lived. Christianity, a young, vigorous, and hostile system, was rooting itself in the hearts of men deeper and deeper every day, and these disciples of Plato—tenderly attached to their ancestral religion—felt that something must be done to preserve from going out the fires that were feebly burning on the altars of the ancient gods.

But these commentators and expositors of Plato were not remarkable for their philosophical power; a fresh stream of life was first poured into the old channels of Platonic speculation by Ammonius Saccas (q. v.) and Plotinus (q. v.), and it is this fact which gives the school which they established its best claim to the exclusive title of *Neo-Platonist*. "In no species of grandeur was the Alexandrian school deficient," as M. Salisset justly observes: "genius, power, and duration have consecrated it. Re-animating during an epoch of decline the fecundity of an aged civilisation, it created a whole family of illustrious names. Plotinus, its real founder, resuscitated Plato; Proclus gave the world another Aristotle; and in the person of Julian the Apostate, it became master of the world. For three centuries it was a formidable rival to the greatest power that ever appeared on earth—the power of Christianity; and if it succumbed in the struggle, it only fell with the civilisation of which it had been the last rampart" (Lewes's "Biog. Hist. Phil." p. 259). The essence of *all* the Alexandrian speculations, we have stated, consists in the blending of Platonic ideas with Oriental mysticism; the peculiarity of the *Neo-Platonists*, strictly so-called, lies simply in the novelty, audacity, and ingenuity of their reasonings. They aimed at constructing a religion on the basis of dialectics. They strove to attain a knowledge of the Highest, and the way in which they endeavored to accomplish this was by assuming the existence of a capacity in man for passing beyond the limits of his personality, and acquiring an intuitive knowledge of the absolute, the true—that which is beyond and above the ductundions and dubieties of "opinion." This impersonal faculty is called *Ecstasy*. By means of it, man—ceasing, however, it should be observed, to be individual man, i. e., *himself*—can identify himself with the Absolute (or Infinite). Plotinus, in fact, set out from the belief that "philosophy" (i. e. "Absolute truth") is only possible through the identity of the thinker, or rather of the subjective thought, with the thing thought of, or the objective thought. This intuitive grasp or "vision" of the Absolute is not constant; we can neither force nor retain it by an effort of will; it springs from a divine inspiration and enthusiasm, higher and purer than that of poet or prophet, and is the choicest "gift of God."

The god of Plotinus and the other Alexandrians is a mystical Trinity, in the exposition of which they display a dialectical subtlety that even the most ingenious of the schoolmen never reached. The Divine Nature contains within it three Hypotheses (Substances); its basis, if we may so speak, is called unity, also poetically Primitive Light, &c. The Unity is not itself any *thing*, but the principle of all things; it is absolute good, absolute perfection; and though utterly incapable of being conceived

by the understanding, there is that in man that assures him that it—the incomprehensible, the ineffable, *is*. "It has neither quantity nor quality; neither reason nor soul; it exists neither in motion nor repose; neither in space nor time; it is not a numeric unity nor a point; .... it is pure *Esse* without Accident; .... it is exempt from all want or dependency, as well as from all thought or will; it is not a thinking Being, but Thought itself—the principle and cause of all things." To the sceptic this "Primitive Light," we are afraid, will not seem very luminous. From "Unity," as the primordial source of all things, emanates "Pure Intelligence" (*Nous*—the *Vernunft* of modern German metaphysics); its reflection and image, that by which it is intuitively apprehended; from pure Intelligence, in turn, emanates the "Soul of the World" (*Psyche tou pantos*), whose creative activity produces the souls of men and animals, and "Nature;" and finally from nature proceeds "Matter," which, however, is subjected by Plotinus to such refinement of definition that it loses all its grossness. Unity, Pure Intelligence, and the World-Soul thus constitute the Plotinian Triad, with which is connected, as we have seen, the doctrine of an eternal Emanation, the necessity of which he endeavors to demonstrate by the most stringent logic. Human souls, whose source is the Pure Intelligence, are—by some mysterious fate—imprisoned here in perishable bodies, and the higher sort are ever striving to ascend to their original home. So Plotinus, when in the agonies of death, said calmly to his friends: "I am struggling to liberate the divinity within me."

The most distinguished pupil of Plotinus was Porphyry (q. v.), who mainly devoted himself to expounding and qualifying the philosophy of his master. In him we see, for the first time, the presence of a distinctively anti-Christian tendency. Neo-Platonism, which can only be properly understood when we regard it as an attempt to place Paganism on a philosophical basis—to make the Greek religion philosophical, and Greek philosophy religious—did not *consciously* set out as the antagonist of Christianity. Neither Ammonius Saccas nor Plotinus assailed the new faith; but as the latter continued to grow, and to attract many of the most powerful intellects of the age into its service, this latent antipathy began to shew itself. Porphyry wrote against it; Iamblichus (q. v.), the most noted of his pupils, did the same. The latter also introduced a theurgic or "magical" element into Neo-Platonism, teaching, among other things, that certain mysterious practices and symbols exercised a supernatural influence over the divinities, and made them grant our desires. Magic is always popular, and it is therefore not wonderful that Iamblichus should have had numerous followers. Iodestius succeeded to his master's chair, and appears to have had also a considerable number of disciples. To the school of one of them the Emperor Julian belonged, whose patronage for a moment shed a gleam of splendor over Neo-Platonism, and seemed to promise it a universal victory. After a succession of able, but not always consistent teachers, we reach Proclus (q. v.), the last great Neo-Platonist, who belongs to the 5th c., a man of prodigious learning, and of an enthusiastic temperament, in whom the pagan-religious, and consequently anti-Christian, tendency of the Neo-Platonic philosophy culminated. His ontology was based on the Triad of Plotinus, but was considerably modified in detail; he exalted "Faith" above "Science" as a means of reaching the Absolute Unity; was a believer in Theurgy, and so naturally laid great stress upon the ancient Chaldean oracles, Orphic hymns, mysteries, &c., which he regarded as divine revelations, and of which he considered himself—as, indeed, he was—the last great "interpreter." His hostility to the Christian religion was keen; in its success he saw only the triumph of a vulgar popular superstition over the refined and beautiful theories of philosophy; it was as if he beheld a horde of barbarians defacing the statues and records of the Pantheon. The disciples of Proclus were pretty numerous, but not remarkable for high talent. Perhaps the ablest of his successors was Damascius, in whose time the Emperor Justinian, by an arbitrary decree, closed the schools of the heathen philosophers. "The victims," says Cousin ("Cours d'Histoire de la Philosophie Moderne"), "of fierce retaliation, and of an obstinate persecution, these poor Alexandrians, after having sought an asylum in their dear East, at the court of Chosroes, returned to Europe (533 A.D.), were dispersed over the face of the earth, and the most part extinguished in the deserts of Egypt, which were converted for them into a philosophic Thebais." See Fichte, "De Philosophiæ Novæ Platonice Origine" (Berl. 1813); Bonterwek, "Philosophorum Alexandrinorum ac Neo-Platoniorum, recensio accuratior" (Göt. 1821); Matter, "Essai Historique sur l'Ecole d'Alexandrie" (2 vols.

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Par. 1820); Simon, "Histoire de l'Ecole d'Alexandrie" (3 vols. Par. 1845); Barthélemy St Hilaire "De l'Ecole d'Alexandrie" (Par. 1845); Lewes, "Biographical History of Philosophy" (1857); and Ueberweg's "History of Philosophy" (Translation, Hodder and Stoughton 1872).

**NEOZOIC** (Gr. new life), a term introduced by Edward Forbes to include all the strata from the Trias to the most recent deposits. They are generally divided into the two great groups of Secondary and Tertiary Rocks. This division is, however, quite arbitrary—The chief point of difference depending on the occurrence in the Tertiary deposits of species supposed to be the same as some still living. There is no paleontological nor petrological break similar to that which exists between the Permian and Trias. Forbes, accordingly, suggested the obliteration of the division between the Secondary and Tertiary series, and the division of all geological time into two epochs—the Palæozoic and the Neozoic.

**NE'PA** and **NEPIDÆ**. See **WATER-SCORPION**.

**NEPAUL**, or **Nipal**, an independent kingdom of Hindustan, lying on the southern slope of the Himalayas, is bounded on the n. by Tibet, on the s. and w. by British India, and on the e. by Sikim, a protected state. Long. 80° 15'—88° 15' e. It is 500 miles in length, by about 109 miles in average breadth. Area, 56,745 sq. m.; pop. estimated (1873) at 3,000,000. The kingdom is separated from the plains of India by the long narrow strip of land resembling an English down, but unhealthy, called the Terai, which extends along the whole southern border. North of this, and running parallel with it, is the great forest of N., from 8 to 10 miles broad. North of this strip is a tract of hilly country, and above that are two tracts of greater elevation, the first of which may be called mountainous, while the second might appropriately be called Alpine, if it did not comprise among its mountain peaks, which like Mount Everest and Dhaulagiri, attain almost twice the elevation of Mount Blanc. The principal rivers are the Kurnalli, the Gogra, the Rapti, the Gunduk with its tributaries, and the Kosi. The climate, most unhealthy in the Terai, is healthy and pleasant in the hilly and mountainous districts, suggesting that of Southern Europe. In the *Valley of N.*—the district surrounding the capital—the heat of Bengal which is felt in the hollows, may be exchanged for the cold of Russia by ascending the slopes of the hills which enclose it. The soil is extremely rich and fruitful. Barley, millet, rice, maize, wheat, cotton, tobacco, sugar-cane, pine-apple, and various tropical fruits are cultivated. Gold has not been found, but iron and copper mines are worked. The inhabitants consist mainly of two tribes—the Gurkhas, whose chief occupation is war, and the Newars, who are principally artisans. The capital of the country is Khatmandu (q. v.).

**NEPENTHES**, the only known genus of a natural order of exogenous plants called *Nepenthaceæ*, consisting of herbaceous or half-shrubby plants with diocious flowers, natives of swampy ground in India and China, chiefly remarkable for their leaves. Each leaf consists of a dilated foliaceous petiole, prolonged beyond its foliaceous part, as if it were the prolongation of the midrib of a leaf, and terminating in a pitcher (*ascidium*), from which the name **PITCHER PLANT** has been very generally given to the species of this order. The pitcher is terminated by a lid, which is regarded as the true blade of the leaf. The fluid found in these pitchers is a secretion of the plant itself. Insects often enter the pitcher, and are apparently there dissolved and absorbed; so that the N. would rank amongst the plants called "Insectivorous" by Mr Darwin. Pitcher plants (*N. distillatoria*) are not uncommon in our hothouses.

**NEPHELIUM**. See **LITCHI**.

**NE'PHRITE**, a mineral which is not unfrequently called **Jade** (q. v.), and of which *Axestone* (q. v.) is very generally considered a variety. It is composed of silica, magnesia, and lime; is compact, with a coarse splintery fracture, very tenacious, sometimes translucent, greasy to the touch, and of a green or greenish color. It is found in granite, gneiss, greenstone, &c., in many parts of the world. Very fine specimens are brought from Persia, Siberia, and China, and are known as *Oriental Jade*. The kind called *Indian Jade* is olive green, and strikes fire with steel; that from China is whitish, and does not strike fire. N. is used for ornaments. The Turks make it into handles for sabres and daggers. Many imaginary virtues were

once ascribed to it, such as the cure of epileptic fits and of nephritic (Gr. *nephros* kidney) complaints; hence its name.

NEPHRITIS (Gr. *nephros*, kidney), inflammation of the Kidneys. (q. v.).

NEPOMUC. See JOHN OF NEPOMUK.

NEPOS, Cornelius, a Roman historian, born in the first c. a.c., but the place and precise time of his birth are unknown. He was the friend of Cicero and Catullus. The only work of N.'s which has survived (if indeed it be his), is a series of twenty-five generally brief biographies of warriors and statesmen, mostly Greeks. These biographies are distinguished by the purity of their Latinity, the conciseness of their style, and their admirable exhibition of character, but sufficient care has not been exercised in the examination of authorities, nor in the relative importance of things duly regarded. Until the middle of the 16th c. these biographies, on the strength of the titles given in the various MSS., were generally ascribed to Æmilius Probus, a writer who lived in the latter part of the 4th c.; but in 1549, an edition was put out by the famous Dionysius Lambinus, who pronounced the so-called "Lives" of Æmilius Probus to be in reality the lost work of Cornelius Nepos, "*De Viris Illustribus*." His weightiest argument is drawn from the excellence of the Latin, and the chastity of the style, so unlike the corrupt and florid language of the Decline. Many critics hold that these Lives ought to be regarded as an abbreviation of the work of N. by Probus. This hypothesis is not without its difficulties, but it is perhaps the least objectionable of any. There are many editions, among which may be mentioned those of Van Staveren (Leyd. 1778), of Tzschucke (Gott. 1804), and of Bremi (Zur. 1820); and the book is in general use as a school-book. It has been very frequently translated into English and other languages.

NEPTUNE, an ancient Italian god. It was doubtful whether he was originally a marine deity at all, for the old Italians were the very opposite of a maritime people, yet his name is commonly connected with *nato*, to swim; hence at an earlier period he may have borne another designation, afterwards forgotten. When the Romans became a maritime power, and had grown acquainted with Grecian mythology, they, in accordance with their usual practice, identified him with the Greek god whom he most resembled. This was *Poseidōn*, also *Poteidan* (connected with *potos*, a drink, *ontos*, the sea, and *potamos*, a river). Poseidon appears in his most primitive mythological form as the god of water in general, or the fluid element. He was the son of Cronos (Saturn) and Rhea, and a brother of Jupiter. On the partition of the universe amongst the sons of Cronos, he obtained the sea as his portion, in the depths of which he had his palace near Æge, in Eubœa. Here also he kept his brazen-hoofed and golden-maned steeds, in a chariot drawn by which he rode over the waves, which grew calm at his approach, while the monsters of the deep, recognizing their lord, made sportive homage round his watery path. But he sometimes presented himself at the assembly of the gods on Olympus, and in conjunction with Apollo, built the walls of Troy. In the Trojan war he sided with the Greeks; nevertheless he subsequently shewed himself inimical to the great sea-wanderer Ulysses, who had blinded his son Polyphemus. He was also believed to have created the horse, and taught men its use. The symbol of his power was a trident, with which he raised and stilled storms, broke rocks, &c. According to Herodotus, the name and worship of Poseidon came to the Greeks from Libya. He was worshipped in all parts of Greece and Southern Italy, especially in the seaport towns. The Isthmian games were held in his honor. Black and white bulls, boars, and rams were offered in sacrifice to him. N. was commonly represented with a trident, and with horses or dolphins, often along with Amphitrite, in a chariot drawn by dolphins, and surrounded by tritons and other sea-monsters. As befitting the fluctuating element over which he ruled, he is sometimes figured asleep or reposing, and sometimes in a state of violent agitation.

NERBU'DDAH, a river of Hindustan, rises in the Vindhya Mountains, at a height of from 3000 to 4000 feet above sea-level, in lat. 22° 40' n., long. 81° 52' e. It flows west, past Jabalpur (190 miles from its source), where the great depression between the Vindhya Mountains on the north and the Satpura Mountains on the south, known as the Valley of the N., begins. The other principal towns on its banks are Hoshangabad, Burhant, and Barnehi. At Hoshangabad it is 900 yards wide, and from five to six feet in depth. At Barnehi it begins to expand into a wide estuary,

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and after flowing 80 miles further, it falls into the Gulf of Cambay. Entire length about 800 miles, of which 55 miles are navigable for ships of considerable size.

**NERCHINSK**, an important mining town of Russia, Eastern Siberia, in the Trans-Baikal Territory, on the Nercha, a tributary of the Shilka, in lat. 51° 56' n., long. 116° 35' e., 4707 miles from St Petersburg. It was founded in 1658, and had, in 1867, 3968 inhabitants. The district of which N. is the centre yields a good deal of gold yearly, together with large quantities of silver, lead, and iron, and precious stones. The only tin-mines in the empire are worked here. The soil in the vicinity is fertile, and the climate mild and agreeable.

**NE'REIS**, a genus, and *Nereidæ*, a family of *Annelida*, having a long slender body, a distinct head, with tentacles and eyes; the whole body covered with tubercles, and the gills lobed and tufted. They are all marine, and generally hide under rocks or in the sand. They swim actively, by rapid and undulating inflexions of the body, and by the aid of numerous oars arranged along the sides; each formed of a stout footstalk, numerous bristles, and a flap. The proboscis is thick, strong, and armed with two jaws.

**NE'REITES**, the name given to animals which have left their impress on the Silurian Rocks, and which exhibit a form similar to the modern *Nereis*. They occur on the surface of the laminae of fine shales over which, when it was soft, the creature moved, leaving a long and tortuous trail, which is generally found to terminate in a more defined representation produced apparently by the body itself, although every trace of it has disappeared. See **TECHNOLOGY**.

**NERI**, Philip de, a saint of the Roman Catholic Church, and founder of the Congregation of the Oratory (q. v.), was born of a distinguished family in Florence, July 21, 1515. His character, even in boyhood, foreshadowed the career of piety and benevolence to which he was destined, and he was commonly known among his youthful companions by the name of "good Philip." On the death of his parents, he was adopted by a very wealthy uncle, with whom he lived for some time at San Germano, near Monte Casino, and by whom he was recognised as his destined heir. But he relinquished all these prospects, for a life of piety and charity, and having come to Rome in 1534, he there completed his philosophical and theological studies, and won the esteem and reverence of all by his extraordinary piety, and his benevolence and activity in every good work whether of charity or of religion. Although he did not receive priest's orders till 1551, he had already been for years one of the most earnest and devoted in all the pious works of Rome for the instruction of the poor, the care of the sick, and the reclamation of the vicious; and in 1550, in unison with several of his friends, he established a confraternity for the care of poor pilgrims visiting Rome, and other houseless persons, as well as of the sick generally, which still subsists, and which has numbered among its associates many of the most distinguished members of the Roman Catholic Church. This confraternity, however, is chiefly note worthy as having been the germ of the far more celebrated **CONGREGATION OF THE ORATORY** (q. v.), which was founded by St Philip in concert with his friends Baronius and Tarugio, both afterwards cardinals, Sabietti, and some others. Besides the general objects above indicated, and the spiritual duties designed for the personal sanctification of the members, the main object of this association was the moral instruction and religious training of the young and uneducated, who were assembled in chapels or oratories, for prayer and for religious and moral instruction. As a further means of withdrawing youth from dangerous amusements, sacred musical entertainments (thence called by the name of *oratorio*) were held in the oratory, at first consisting solely of hymns, but afterwards partaking of the nature of sacred operas or dramas, except that they did not admit the scenic or dramatic accompaniments of these more secular compositions. Religious and literary lectures also formed part of his plan, and it was in the lectures originally prepared for the Oratory that, at the instance of N., the gigantic "Church History" of Baronius had its origin. The personal character of N., the unselfish devotedness of his life, his unaffected piety, his genuine love of the poor, his kindly and cheerful disposition, and, perhaps, as much as any of the rest, a certain quaint humor, and a tinge of what may almost be called drollery which pervaded many of his sayings and doings, contributed to popularise his institute, and to engage the public favor for himself and his fellow-laborers. He himself enjoyed

the reputation of sanctity and of miracles among his fellow-religionists almost beyond any of the modern saints; and he may still be described as emphatically the popular saint of the Roman people. He lived to an extreme age in the full enjoyment of all his faculties, and in the active discharge to the last of all the charitable duties to which his life had been devoted. He died at the age of 80, May 26, 1595. He was canonised by Gregory XV. in 1623. His only literary remains are his "Letters" (ovo, Padua, 1751); the "Constitutions" of his congregation, printed in 1619; some short spiritual treatises, and a few sonnets which are printed in the collection of "Rime Oneste."

**NERIA'D**, a town of British India, in the presidency of Bombay and district of Kaira, on the route from Baroda to Ahmedabad, 88 miles north-west from Baroda, on a feeder of the Sabarmati. It is the chief town of an extensive and well-cultivated tract, which produces much tobacco, and contains many prosperous towns and villages. Pop. (1871) 25,530.

**NERIUM**. See **OLEANDER**.

**NERO**, Roman emperor from 54 A.D. to 68 A.D.; was born at Antium, on the coast of Latium, 15th December 37 A.D., and was the son of Cn. Domitius Ahenobarbus and of Agrippina, the daughter of Germanicus Caesar, and sister of Caligula. His mother becoming the wife of the Emperor Claudius, Claudius adopted him (50 A.D.), and his name, originally L. Domitius Ahenobarbus, was changed to Nero Claudius Caesar Drusus Germanicus. After the death of Claudius (54 A.D.), the Praetorian Guards, at the instigation of Afranius Burrhus, their prefect, declared him emperor, instead of Claudius' son Britannicus, and their choice was acknowledged both by the senate and the provinces. His reign began with the semblance of moderation and good promise, under the guidance of Burrhus and his tutor Seneca the philosopher; but the baleful influence of his mother, together with his own moral weakness and sensuality, frustrated their efforts, and he soon plunged headlong into debauchery, extravagance, and tyranny. He caused Britannicus, the son of Claudius, to be treacherously poisoned at the age of 14, because he dreaded him as a rival, and afterwards (59 A.D.) caused his own mother Agrippina (with whom he was latterly on bad terms) to be assassinated, to please his mistress Poppæa Sabina (the wife of his principal boon-companion Otho, afterwards emperor), in order to marry whom he also divorced and afterwards put to death his wife Octavia (aged 30), the sister of Britannicus. The low servility into which the Roman senate had sunk at this time, may be estimated from the fact that it actually issued an address congratulating the hateful matricide on the death of Agrippina. N. himself, on the other hand, confessed that he was ever haunted by the ghost of his murdered mother. The affairs of the empire were at this time far from tranquil. In 61 A.D., an insurrection broke out in Britain under Queen Boadicea, which was, however, suppressed by Suetonius Paulinus. The following year saw an unsuccessful war against the Parthians in Armenia. At home, matters were not much better. The emperor was lampooned in verse; the senate and priesthood, alike venal, were also satirised by audacious malcontents; Burrhus, a valuable friend, died; and even Seneca, though not a great moralist, out of his books, thought it only decent to remove from court. In July 64, occurred a great conflagration in Rome, by which two-thirds of the city were reduced to ashes. N. himself is usually believed to have been the incendiary. It is said that he admired the spectacle from a distance, reciting verses about the burning of Troy, but many scholars are doubtful whether he really had any hand in it. At all events he laid the blame on the Christians—that mysterious sect, who, like the Jews in the middle ages, were the cause of all otherwise inexplicable calamities, and persecuted them with great fury. Moreover, he rebuilt the city with great magnificence, and reared for himself on the Palatine Hill a splendid palace, called, from the immense profusion of its golden ornaments, the *Aurea Domus*, or Golden House; and in order to provide for this expenditure, and for the gratification of the Roman populace by spectacles and distributions of corn, Italy and the provinces were unsparingly plundered. A conspiracy against him failed in the year 66, and Seneca and the poet Lucan fell victims to his vengeance. In a fit of passion he murdered his wife Poppæa, by kicking her when she was pregnant. He then proposed to Antonia, the daughter of Claudius, but was refused, whereupon he caused the too fastidious lady to be put to death, and married Statilia

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Messallina, after killing her husband. He also executed or banished many persons highly distinguished for integrity and virtue. His vanity led him to seek distinction as a poet, a philosopher, an actor, a musician, and a charioteer, and he received sycophantic applauses, not only in Italy, but in Greece, to which, upon invitation of the Greek cities, he made a visit in 67. But in 68, the Gallic and Spanish legions, and after them the Pretorian Guards, rose against him to make Galba emperor, and N. fled from Rome to the house of a freedman, Phaon, about four miles distant. The senate, which had hitherto been most subservient, declared him an enemy of his country, and the tyrant ended his life by suicide, 11th June 68. One is sorry to learn that such a wretch had a taste for poetry, and was skilled in painting and modelling.

NERVA, M. Cocceius, a Roman emperor, elected by the senate after the murder of Domitian, 18th September 96. He was born 32 A.D., of a family belonging to Narnia, in Umbria, and twice held the honour of consulship before his election to the dignity of emperor. He displayed great wisdom and moderation, rectified the administration of justice, and diminished the taxes; but finding himself, upon account of his advanced age, not vigorous enough to repress the insolence of the Pretorian Guards, he adopted M. Ulpian Trajanus, then at the head of the army of Germany, who succeeded him on his death, 27th January 98. After his decease, he obtained an apotheosis.

NERVOUS DISEASES OF AN OBSCURE NATURE AND NERVOUSNESS. Although the most important affections of the nervous system, as chorea, convulsions, epilepsy, hydrophobia, hypochondriasis, hysteria, neuralgia, paralysis, spasms, and tetanus, have been considered in special articles, there is an infinite variety of (often evanescent) forms which the diseases of the nervous system assume, some of which we propose now to consider.

These nervous affections are almost solely confined to women, and most of them may be regarded as modified forms of hysteria. *Simulated Pregnancy*, or, as the French physicians term it, *Nervous Pregnancy*, is an affection of not very rare occurrence. The abdomen generally enlarges, the catamenia are suppressed, and sickness, enlargement of the breasts, with the other symptoms of pregnancy, supervene (as far as they can be recognised by the non-professional observer), and it is only the non-appearance of the infant at the expected period that leads to a suspicion of the true nature of the case. The diagnosis of such a case is extremely difficult, and the most celebrated accoucheurs have been deceived. We commence with this extreme instance, as being singularly illustrative of the power which a perverted action of the nervous system may impress upon certain persons. The somewhat allied cases in which patients persist in fancying themselves pregnant in opposition to the opinion of their medical adviser (as the well-known case of Queen Mary, so admirably drawn by Froude), are far more numerous. The intestines are often implicated in cases of a deranged condition of the nervous system. The excretion of gas from the intestinal mucous membrane is often much increased in the class of patients commonly called nervous. The rattling sounds produced by the movement of the gas—scientifically known as *bomborygmi*—are sometimes so loud as to prevent the patient from entering into society with comfort; and sometimes the mere fear of the occurrence of these sounds is sufficient to induce them. A depraved appetite, scientifically known as *pica*, is a common symptom of deranged nervous system both in chlorotic young women, in whom the catamenial discharge is not well established, and in pregnant women. See MORBID APPETITES. The not very rare cases of fasting women and girls belong to the same category. All these cases, however, ultimately undergo detection.

Dr Parry and other physicians have described cases of morbid sensibility of the mucous membrane of the pharynx, in which the muscles of the larynx are called into violent action if the patient takes a sip of water or other fluid. Such cases so strongly stimulate hydrophobia, that they are described as hysterical hydrophobia.

Passing on to the special modifications which an abnormal state of the nervous system impresses on the organs of circulation, we have nervous palpitation of the heart, which may readily be distinguished from palpitation dependent on change of structure by due attention to symptoms. There is a peculiar form of abdominal pulsation, due solely to nervous influence, which may not very unfrequently be

felt on pressing the hand on the patient's abdomen. It has in many cases been mistaken for aneurism.

The nervous symptoms implicating the respiratory organs are not only the most common of any, but are alarming and urgent, and may be readily mistaken for indications of serious inflammatory or organic disease. Nervous asthma, which is supposed to depend upon a spasmodic constriction of the bronchial tubes, is too well known to require comment. Women suffering from a deranged condition of the nervous system sometimes present symptoms of what may be termed nervous catarrh—such as a copious flow of tears, free discharge from the nostrils, and constant sneezing. Such cases are often periodic. They may be treated with preparations of iron, and are sometimes at once checked by a pinch of snuff. There are various forms of cough due mainly to nervous irritation, the difference in the character of the cough probably depending on the spot which is the seat of irritation. Thus, we hear of *spasmodic* cough, which is often accompanied by much straining and convulsive agitation, and somewhat resembles whooping-cough; *ringing* cough, accompanied by dyspnoea and hoarseness, or loss of voice; *barking* cough, often arising from irritation of the ovaries, &c. Such coughs as these are aggravated by depleting measures, ordinary cough medicines, &c., and usually disappear under the use of tonics.

The nervous affections of the motor system are conveniently grouped by Dr Laycock under three heads—(1) the first including those cases in which their is paralysis or spasm without distortion; (2) those in which distortion follows cessation of muscular equilibrium, as in the various form of club-foot; and (3) paroxysmal affections. The best example of the *first* class is hysterical paralysis of the lower extremities, of which Sir Benjamin Brodie long ago wrote as follows: "I have known not a few, but very numerous instances of young ladies being condemned to the horizontal posture, and even to the torture of caustic issues and setons, for several successive years, in whom air and exercise, and cheerful occupations would probably have procured a cure in the course of a few months." A notice of such cases as these may be found in the article HYSTERIA. Paralysis of a lateral half of the body, or of one limb only, may also be merely a manifestation of hysteria. The *second* class is well illustrated by the following case, which is reported by Mr Shaw. A young lady who had suffered from a train of symptoms indicative of a disturbed nervous system, had the ankle so turned round that she walked on one side of the foot. The knee was also bent outwards, and the spine was becoming distorted. Sir Charles Bell, who saw her in consultation, regarded the case as one of wilful deception, and in a year's time his diagnosis was completely established, scarcely any trace of lameness being apparent. Many of the joints—as the knee, hip, &c.—may be the seats of purely neuralgic symptoms, which so closely simulate organic disease of the cartilages, as to lead to the removal of the limb. Carmichael, Brodie, and others have recorded cases in which this terrible mistake has been made by experienced surgeons. Spinal irritation, or spinal tenderness, is a mysterious affection, whose diagnostic value is not very definite, as it may arise from a large number of distinct conditions, as, for example, disease of some part of the spinal cord, uterine disease, chronic disease of the intestinal viscera, &c.

One of the most anomalous affections of the nervous system ever recorded is described by Mr Holden in the "St Bartholomew's Hospital Reports," 1867, vol. III., pp. 299-305. The patient was a bright-looking boy about 12½, who, as he lay reading in bed, presented every appearance of perfect health: all that he complained of was what he called his "bump," which was about the size of a hen's egg, and lay on the right side of the neck, just above the shoulder. If the "bump" were touched, even most gently, the boy instantly lost all consciousness, and became deaf, dumb, and blind, while his body became arched like a bow, and was supported only by the back of the head and the heels, while his arms were rigidly extended. He might be pinched or pricked, but shewed no sign of sensation. After remaining in this state for somewhat less than a minute, he drew a deep long breath, which was followed by a deep sigh. Instantly the spasm ceased, and the body fell, seemingly lifeless, on the bed. After two other similar sighs, which occurred in a few seconds, the boy awoke as if from profound sleep, and in a few minutes was none the worse for what he had gone through. Whenever the bump was touched—even when the boy was fast asleep—the same phenomena occurred. (It was found that,



on touching the backbone in the dorsal region, the same series of events happened.) By continuous gentle manipulation of the bump, the boy was kept unconscious for twenty minutes. Another and even more remarkable phase of the boy's affection was his crowing and barking fit, which took place every day at the same time, almost to a minute. See the Reports above cited.

With this illustration, we close our remarks on what may be termed *Anomalous Nervous Affections*. With regard to *Nervousness*, which also stands at the head of this article, we may observe, that it is a word pertaining rather to the vocabulary of the patient (and pre-eminently of the female patient) than of the physician. It is usually understood to indicate a condition of which a restless mobility, with or without an undue excitability of the nerves of sensation, is the chief characteristic. For further information on this subject, the reader is referred to Dr Laycock's various works, and to Romberg "On Diseases of the Nervous System," 2 vols., translated by Dr Sieveking.

**NERVOUS SYSTEM.** The, is composed in all vertebrated animals of two distinct portions or systems—viz., the *cerebro-spinal* and *sympathetic* or *ganglionic*.

The *cerebro-spinal system* includes the brain and spinal cord (which form the *cerebro-spinal axis*), and the cranial and spinal nerves. It was termed by Bichat the nervous system of animal life, and comprises all the nervous organs concerned in sensation, volition, and mental action.

The *sympathetic system* consists essentially of a chain of ganglia connected by nervous cords, extending from the cranium to the pelvis, along each side of the vertebral column, and from which nerves with large ganglionic masses proceed to the viscera and blood-vessels in the cavities of the chest, abdomen, and pelvis. It was termed by Bichat the nervous system of organic life, since it seems to regulate—almost or quite independently of the will—the due performance of the functions of the organs of respiration, circulation, and digestion.

The essential parts of the *cerebro-spinal axis* are described in the articles **BRAIN**, **CEREBRUM** and **CEREBELLUM**, and **SPINAL CORD**. The brain and spinal cord are covered and protected by three membranes or *meninges*, as they are frequently termed—viz., the *dura mater*, the *arachnoid*, and the *pia mater*. The *dura mater* is a strong fibrous membrane, which supplies the cranial bones with blood in early life, and adheres firmly to their inner surface. It is less closely attached to the bony walls of the spinal canal. Inside the cranium it gives off processes (such as the *fala cerebri*, *tentorium cerebelli*, and *fala cerebelli*) which divide and support different parts of the brain; it gives a strong fibrous sheath to every nerve; and by splitting into two layers at certain points, it forms receptacles for venous blood, which are termed **SINUSES** (q. v.). The *arachnoid* (so called from its being supposed to be as thin as a spider's web) is a serous membrane, and, like all serous membranes, is a closed sac, consisting of a parietal and a visceral layer. The parietal layer adheres to the inner surface of the *dura mater*, to which it gives a smooth polished appearance; while the visceral layer somewhat loosely invests the brain and spinal cord, from direct contact with which, however, it is separated by the intervention of the *pia mater* and some loose areolar tissue. In most regions there is an interval between the visceral layer of the *arachnoid* and the *pia mater*, which is called the *sub-arachnoid cavity*, and is filled during life by the *cerebro-spinal fluid*. This fluid, which varies in quantity from two to ten ounces, keeps the opposed surfaces of the *arachnoid* in close contact, and affords mechanical protection to the nervous centres which it surrounds, and guards them against external shocks. It is accumulated in considerable quantity at the base of the brain, where it serves for the protection of the large vessels and nerves situated there. In fracture of the base of the skull, the draining away of this fluid, often in very large quantity, through the external auditory meatus, is often one of the most significant symptoms. It is doubtless secreted by the *pia mater*, which is the immediate investing membrane of the brain and spinal cord. This membrane consists of minute blood-vessels, held together by an extremely fine areolar tissue. It dips down between the convolutions and fissures of the brain, and is prolonged into the interior, forming the *velum interpositum* and the choroid plexuses of the fourth ventricle. It is by means of this membrane that the blood-vessels are conveyed into the nervous substance.

We now proceed to notice the nerves connected with the cerebro-spinal centre or

axis. These are usually described in two classes—the *spinal* and the *cranial* or *encephalic*. The former class consists of all those which arise from the spinal cord, and emerge from the spinal canal through the intervertebral foramina; while the latter includes those which arise from some part of the cerebro-spinal centre, and emerge through foramina in the cranium or skull.

The *Spinal Nerves* (exclusive of the spinal accessory nerve, which, from the fact that it emerges from the skull, is usually ranked among the cranial nerves) are thirty-one on either side, there being a pair for each pair of intervertebral foramina (whose formation is described in the article VERTEBRA AND VERTEBRAL COLUMN), and for the foramina between the atlas (the first or highest vertebra) and the occipital bone at the base of the skull. Every spinal nerve arises from the cord by two roots, an anterior and a posterior, of which the latter is distinctly the larger. Each root passes out of the spinal canal by a distinct opening in the dura mater. Immediately after its emergence, a ganglion is seen on the posterior root, and in the anterior surface of this ganglion the anterior root lies imbedded. Just beyond the ganglion, but not at all previously, the nervous fibres of both roots intermingle, and a compound nerve results. The trunk thus formed separates immediately after it has passed through the intervertebral canal into two divisions—the anterior and posterior—each of which contains filaments from both roots, and possessing, as will be immediately shown, perfectly different functions. These divisions, of which the anterior is considerably the larger, proceed to the anterior and posterior parts of the body respectively, and are distributed to the skin and the muscles. The anterior branch communicates with the sympathetic nerve. The mode of connection of the roots of the nerves with the cord is noticed in the article SPINAL CORD. These nerves are arranged in classes, according to the regions of the spine in which they originate, and we thus speak of eight cervical, twelve dorsal, five lumbar and six sacral nerves on either side.

The discovery of the separate functions of the anterior and posterior roots of the spinal nerves, which has been characterised as the first important step towards a right understanding of the physiology of the nervous system, was made by our distinguished countryman Sir Charles Bell, although there is reason to believe that Magendie, without any knowledge of Bell's experiments, arrived at similar conclusions at nearly the same time. The original experiments consisted in laying open the spinal canal in rabbits, and irritating or dividing the roots of the spinal nerves. It was observed that irritation of the anterior roots caused muscular movement, and that the posterior roots might be irritated without giving rise to any muscular action; while division of the posterior roots did not impair the voluntary power over the muscles. Hence it was inferred that the anterior roots were motor (or conveyed motive power to muscles), and the posterior roots not motor; but it was not fully determined what degree of sensibility remained in parts supplied from the divided roots. Numerous physiologists arrived at similar results to those of Bell; but the most conclusive experiments are those of Müller, who operated on frogs, in which, from the great width of the lower part of the spinal canal, the roots of the nerves can be exposed with great facility. In these experiments, it was found that irritation of the anterior root always excited muscular contraction, while no such effect followed irritation of the posterior root; that section of the anterior root caused paralysis (or loss of power) of motion, while section of the posterior root caused paralysis of sensation; and that when the anterior roots of the nerves going to the lower extremity were cut on one side, and the posterior roots on the other, voluntary power without sensation remained in the latter, and sensation without voluntary motion in the former. The obvious conclusion to be derived from these experiments is, that the anterior root of each spinal nerve is *motor*, and the posterior *sensitive*. (In place of the terms *sensitive* and *motor*, the terms *afferent* and *efferent* are now frequently used. The functions of the nerves being to establish a communication between the nervous centres and the various parts of the body, and *vice versa*; an *afferent* nerve communicates the impressions made upon the peripheral nervous ramifications to the centres, while an *efferent* nerve conducts the impulses of the nervous centres to the periphery.)

The *Cranial Nerves*, although twelve in number on either side, were arranged by Willis ("Cerebri Anatomie; cui accessit Nervorum Descriptio et Usus," 1664), whose system is still generally adopted, in nine pairs, which, taken from before backwards

in the order in which they are transmitted through the foramina at the base of the skull, stand as follows: 1st, Olfactory; 2d, Optic; 3d, *Motores Oculorum*; 4th, Pathetic; 5th, Trifacial; 6th, Abducentes; 7th, *Portio Dura* or Facial, *Portio Mollis* or Auditory; 8th, Glossopharyngeal, Par Vagus or Pneumogastric, Spinal Accessory; 9th, Hypoglossal.

They may be subdivided into three groups, according to their functions—viz. *Nerves of Special Sense*—the Olfactory (See Nose), Optic (see Eye), and Auditory (q. v.); *Nerves of Motion or Afferent Nerves*—the *Motores Oculorum*, Pathetic, Abducentes, Facial, and Hypoglossal; and *Compound Nerves*—the Trifacial, Glossopharyngeal, Pneumogastric, and Spinal Accessory.

The reason why no nerve of Taste is included in the above arrangement amongst the nerves of special sense will be subsequently seen; and we proceed briefly to notice the functions of the motor cranial nerves.

The 3d, 4th, and 6th pairs—the *Motores Oculorum*, *Pathetic*, and *Abducentes*—together make up the apparatus by which the muscles of the orbit (the four Recti, the superior and inferior Oblique, and the Levator palpebræ) are called into motion, and are sufficiently noticed in the article EYE.

The *Facial Nerve*, or the *Portio Dura* of the 7th pair, is divisible into three stages. The first stage is the intracranial, from its origin to its exit from the cranial cavity, in association with the *Portio Mollis* or *Auditory Nerve* (q. v.), at the internal auditory meatus. The second stage is contained in the *Aqueduct of Fallopius*, a bony canal lying in the petrous portion of the temporal bone. In this stage it anastomoses with other nerves, and thus *sensory* fibres are introduced into it from the 8th pair and other sources, which make irritation of some of its branches to cause pain. The third stage commences with the emergence of the nerve through the stylo-mastoid foramen. The nerve now lies in the parotid gland, and after giving off the *posterior auricular*, and a few smaller branches, finally divides into the *temporal*, *facial*, and *cervical* branches. This diverging distribution of the nervous branches over the face forms the *pes anserinus* of the older anatomists, from the supposed resemblance to the expanded foot of a goose. Careful dissection of this nerve shews that the great majority of its fibres are distributed to muscles; and indeed, if we except the muscles of mastication, which receive their motor power from the 3d division of the 5th pair, this may be regarded as the general motor nerve of the face. "The muscles which are supplied by the facial nerve are chiefly those upon which the aspect of the countenance and the balance of the features depend. The power of closing the eyelids depends upon this nerve, as it alone supplies the orbicularis palpebrarum; and likewise that of frowning, from its influence upon the corrugator supercilii. Anatomy indicates that this nerve is the motor nerve of the superficial muscles of the face and ear, and of the deep-seated muscles within the ear. This conclusion is abundantly confirmed by comparative anatomy. For wherever the superficial muscles of the face are well developed, and the play of the features is active, this nerve is large. In monkeys it is especially so. That extremely mobile instrument, the elephant's trunk, is provided with a large branch of the facial as its motor nerve. In birds, on the other hand, it is very small."—Todd and Bowman, "Physiological Anatomy and Physiology of Man, vol. II. p. 107.

Before Sir Charles Bell commenced his experiments on the functions of the nerves, it was believed that the facial was the nerve of sensibility of the face, and it was on several occasions divided with the view of relieving tic-douleuroux, of which it was supposed to be the seat. But the operation, of course, yielded no relief, and always inflicted a permanent injury, since it was succeeded by paralysis of the facial muscles, with total loss of control over the features and over the closing of the eye, on the side on which the operation was performed.

The treatment of facial palsy, which is often, especially if it arises from cold, a very temporary affection, although usually a very alarming one to the patient and his friends, is described in the article PARALYSIS.

The *Hypoglossal Nerve* (derived from the Greek words *hypo*, under, and *glotta*, the tongue) escapes from the cavity of the skull by the anterior condyloid foramen, and passes outwards and forwards around the pharynx to the interior surface of the tongue, where it breaks up into its terminal branches, which supply the muscular structure of that organ with motor power. This nerve communicates with the post-

pneumogastric nerve, with the sympathetic (by branches derived from the superior cervical ganglion), and with the cervical plexus, soon after its emergence from the cranium; and subsequently, as it curves round the occipital artery, it gives off the long anastomosing branch known as the *Descendens noni*.

Experiments on living animals, comparative anatomy, and pathological investigations, alike indicate that this is the motor nerve of the tongue. In cases of paralysis of this nerve, the power of articulation is much injured or totally destroyed; and this is often one of the first symptoms which lead the physician to apprehend serious cerebral lesion.

We now proceed to the consideration of the *Compound Nerves*, beginning with the *Trifacial or Fifth Nerve*. This nerve, as was first pointed out by Sir Charles Bell, presents a remarkable resemblance to the spinal nerves in its mode of origin; for it arises by two roots, one large and the other small, and on its larger root, as on the posterior and larger root of the spinal nerves, is a distinct ganglion; the two roots being quite distinct until after the formation of the ganglion, when the lesser one coalesces with the lowest branch, which emerges from the ganglion to form the inferior maxillary nerve. This ganglion, which is known as the Gasserian Ganglion, and which is formed upon the larger root of the nerve, lies upon the upper surface of the petrous portion of the temporal bone, and is of somewhat triangular form, with its base directed forwards and outwards. From this base there proceed three nerves—viz., the ophthalmic, on the inside; the superior maxillary, in the middle; and the inferior maxillary, externally. The first two of these nerves consist exclusively of fibres from the ganglionic root, while the third—the inferior maxillary—is composed of fibres from both roots, and is therefore a compound nerve. From the mode of distribution, as well as from that of origin, it is inferred that the ophthalmic and superior maxillary are purely sensory, while the inferior maxillary is a motor and sensory nerve. Experiments on living animals confirm the inference that have been drawn on anatomical grounds. Division of the ophthalmic or of the superior maxillary nerve, induces loss of sensibility without any serious impairment of muscular power; but when the inferior maxillary nerve, on either side, is divided, the power of mastication is destroyed on that side, and the sensibility of the tongue and of the lower part of the face on that side is lost.

The lingual or gustatory branch of the inferior maxillary is distributed to the mucous membrane and papillæ at the fore part and sides of the tongue, where it acts both as a nerve of common sensibility and of taste. (The consideration of the respective parts which this nerve and the glossopharyngeal play in the sense of taste, is considered in the articles TONGUE and SENSE OF TASTE.

The trifacial nerve is the seat of the affection known as tic-douloureux, and described in the article NEURALGIA. It is in the dental branches of this nerve that toothache is situated; and in the process of teething in young children, the irritation of these branches, consequent upon the pressure of the teeth, often gives rise to convulsions, by being conveyed to the medulla oblongata, and exciting motor nerves by reflex action.

The *Glossopharyngeal Nerve* is principally an afferent or sensory nerve, but has a small motor root. It escapes from the cranium in association with the pneumogastric and spinal accessory nerves, through the same foramen as that through which the jugular vein emerges. It then descends by the side of the pharynx, and after anastomosing with the facial and pneumogastric nerves, and giving off a branch to the tympanum of the ear, terminates in branches to the mucous membrane of the base of the tongue, of the palate, tonsils, and pharynx, and in twigs to the digastric and stylopharyngeal muscles; so that its distribution is almost entirely to sentient surfaces. From a careful examination of the investigations of Dr John Reid and others regarding the functions of this nerve, Todd and Bowman arrive at the following conclusions: 1. "It is the sensitive nerve of the mucous membrane of the fauces and of the root of the tongue, and in the latter situation it ministers to taste and touch, as well to common sensibility; and being the sensitive nerve of the fauces, it is probably concerned in the feeling of nausea, which may be so readily excited by stimulating the mucous membrane of this region." 2. "Such are its peripheral organisation and central connections, that stimulation of any part of the mucous membrane in which it ramifies, excites instantly to contraction all the facial muscles supplied by the pneumogastric and the facial nerves; and the permanent irrita-

tion of its peripheral ramifications, as in the case of sore throat, will affect other muscles supplied by the facial nerve likewise. It is therefore an excitator of the movements necessary to pharyngeal deglutition."—"Op. cit." vol. ii. p. 119.

The *Pneumogastric Nerve* or *Par Vagus*, is distributed to so many important organs (the larynx, heart, lungs, stomach, &c.), and is of such great physiological importance, that a special article is devoted to its consideration.

The *Spinal Accessory Nerve* is more remarkable for its peculiar course than in any other respect. It rises from the spinal cord at the level of the fifth or sixth cervical nerve, passes upwards between the anterior and posterior roots of the cervical nerves into the skull, and emerges from the cranial cavity with the two preceding nerves. It is chiefly distributed to the trapezius muscle.

In the above remarks on the cranial nerves, we have omitted all notice of their points of origin, as that subject is sufficiently noticed in the article BRAIN.

We shall now briefly notice the mode in which the extremities receive their nerves. These nerves are derived from the spinal nerves, through the intervention of what is termed in anatomy a *plexus*. Four or five nerves proceed from the spinal cord for a certain distance, without any communication with each other. They then divide, and from the conjunction of the adjacent branches new nerves result, which again subdivide and interchange fibres. From the net-work or plexus thus formed nerves emerge, each of which is composed of fibres derived from several of the original branches. The most important of these plexuses are found in the regions of the neck, the axilla, the loins, and the sacrum, and are known as the cervical, brachial, lumbar, and the sacral plexuses.

The *Brachial Plexus* is formed by communication between the anterior roots of the last four cervical nerves and the first dorsal nerve. These nerves are nearly equal in size. The branches emerging from this plexus supply the shoulder and the arm.

The *Lumbar and Sacral Plexuses*, with the nerves of the lower extremity, include the first four lumbar nerves which, with the branch from the last dorsal, form the lumbar plexus; the four upper sacral nerves, which, with the last lumbar, form the sacral plexus; the anterior crural or femoral nerve; its branches; its terminal branch, the long or internal saphenous; the gluteal nerve; the lesser ischiatic nerve; the greater ischiatic or sciatic nerve (the largest nerve in the body), dividing at about the lower third of the thigh, the popliteal nerve, the peroneal nerve; muscular branches of the popliteal, given off in the posterior region of the knee; the posterior tibial nerve, dividing into the internal and external plantar nerves, which are distributed to the sides of the toes, in precisely the same manner as the median and ulnar nerves are distributed to the fingers; the external saphenous nerve; and the two terminal branches of the peroneal nerve—viz., the anterior tibial and the musculo-cutaneous nerves.

The general arrangement of the *sympathetic system*, or, as it is sometimes termed, the *sympathetic nerve*, has been already noticed at the beginning of this article. Its cephalic portion consists of four ganglia on either side—viz., (1) the Ophthalmic, or Lenticular Ganglion; (2) the Spheno-palatine, or Meckel's Ganglion; (3) the Otic, or Arnold's Ganglion; and (4) the Submaxillary Ganglion. They are all closely connected with the branches of the trifacial nerve. The cervical portion contains three ganglia, the dorsal twelve, the lumbar four, the sacral five, and the coccygeal one, which, instead of lying on the side of the vertebral column, is placed in front of the coccyx, and forms a point of convergence for the two ganglionated cords which run from the cervical to the sacral region parallel to one another. Each ganglion may be regarded as a distinct nervous centre, from which branches pass off in various directions. In addition to the cords of communication between the ganglia, certain sets of nerves may be usually traced—viz. (1) *visceral* nerves, which generally accompany branches of arteries to the viscera (the lungs, heart, kidneys, liver, spleen, and intestine, &c.); (2) *arterial* branches, distributed to arteries in the vicinity of the ganglia; and (3) branches of *communication* with the cerebral and spinal nerves.

The only nerve that our limited space will permit us to notice is the *great splanchnic*. This nerve arises by separate roots from the 5th, 6th, 7th, 8th, and 9th thoracic ganglia. These roots unite to form a large round cord, which passes obliquely downwards and forwards, and after entering the abdomen by piercing the dia-

phragm, ends in a large and complex ganglion, the *semilunar ganglion*, which lies upon the side and front of the aorta, at the origin of the coeliac axis. The semilunar ganglia, with the nerves entering and emerging from them, combine to form the *solar plexus*, which, from the mass of nervous matter which it contains, has been termed the *abdominal brain*. It is in consequence of the existence of this great nervous centre, that a blow in the region in which it lies always inflicts a severe nervous shock, and not unfrequently causes death.

Experiments and clinical observations lead to the conclusion, that the sympathetic system supplies motor power to many of the internal viscera, especially the heart and the intestinal canal; that it also contains sensitive fibres, as is shewn by the sufferings of patients during the passage of a gall-stone or a renal calculus through a duct, whose sole nervous energy is derived from this system; that it presides over the process of secretion in the most important glands; and that it operates on the blood-vessels in causing them to contract, while the cerebro-spinal nerves produce the opposite effect.

On examining different parts of the nervous system under the microscope, we find that the nervous matter is distributed in two forms, the *vesicular* and the *fibrous*. The vesicular matter is gray in color, and granular in texture, contains nucleated nerve cells, and is largely supplied with blood; it is immediately associated with mental actions, and is the seat in which the force manifested in nervous action originates. The fibrous matter is, in most parts, white and composed of tubular fibres, though in some parts it is gray and consists of solid fibres; it is less vascular than the former, and is simply the conductor of impressions made upon it. When these two kinds of matter are united together into a mass they form a *nervous centre*, such as the brain or spinal cord, while the *nerves* passing to and from them are composed of threads of fibrous matter. The nervous matter of both kinds is a soft, mucous substance, with very slight tenacity; the softness being in a great measure due to the large quantity of water which it contains.

The *fibrous* form is the most extensively diffused throughout the body. It forms a large portion of the nervous centres, and is the main constituent of all the nerves. It occurs in two varieties—viz. as the *tubular fibre*, or the *nerve tube*, and the *gelatinous fibre*, the latter being of comparatively rare occurrence, and being found chiefly in the sympathetic system.

When a *tubular fibre* is viewed by reflected light, it presents a beautiful pearly lustre, and appears to be homogeneous. But if viewed by transmitted light, with a sufficient magnifying power, indications of structure become visible. Externally, there is the *tubular membrane*, a homogeneous and probably very delicate elastic tissue, according to Todd. Within the edge of the tubular membrane, on either side, are seen two thicker and darker lines, which appear to mark the outer and inner limits of the structure known as the *white substance of Schwann*, which forms a tube within the tubular membrane; and within the white substance of Schwann is a transparent material occupying the axis of the nerve tube, and commonly known as the *axis cylinder*. By the application of reagents, it is seen that the chemical composition of the white substance is different from that of the axis cylinder, and hence the functions of these two parts are doubtless different; the latter is in general soft and pulpy. The nerve-tubes are cylindrical in form, and lie parallel to one another, without any innosculation, if we except their frequent terminations in loops. Their average diameter is about 1-3000th of an inch.

The *gelatinous fibres* are flattened, soft, and homogeneous in appearance, and contain numerous round or oval nuclei. Their diameter is about 1-5000th of an inch. In appearance they much resemble the fibres of unstriated muscle.

The *vesicular* form of nervous matter is of a dark reddish-gray color, is found only in the nervous centres, is always well supplied with capillaries, and consists essentially of nucleated cells or vesicles, which are most commonly globular or ovoidal, but often present one or more tail-like processes, when they are termed *caudate*. These caudate vesicles present great difference in shape and size. The processes are very delicate, and readily break off close to the vesicle. They probably either serve to connect distant vesicles, or else become continuous with the axis cylinders of the tubular fibres.

We may now consider the way in which the nerves and nervous centres are made up of these anatomical elements.

A *nerve* is composed of a bundle of tubular fibres surrounded and connected by areolar tissue, which forms a sheath known as the *neurolemma*, whose office is to protect the delicate tubes, and to support the capillaries from which they derive their nourishment.

The *nervous centres* exhibit a union of the vesicular and fibrous textures, which may be variously arranged. In the Brain (q. v.) the vesicular matter lies externally, forming the gray or cineritious substance; in the spinal cord, on the other hand, the vesicular or gray matter lies in the central portion, and the fibrous or white matter is external to it; while in the ganglia the two structures are more or less uniformly associated.

From the observations which have been made in an earlier part of this article on the functions of individual nerves, it is sufficiently obvious that it is through the instrumentality of the nervous system that the mind influences the bodily organs, as when volition or emotion excites them to action; and that, conversely, impressions made on the organs of the body affect the mind, and excite mental perceptions through the same channel. "In this way," to quote the words of Dr Todd, "the nervous system becomes the main agent of what has been called the life of relation; for without some channel for the transmission of the mandates of the will to the organs of motion, or some provision for the reception of those impressions which external objects are capable of exciting, the mind, thus completely isolated, could hold no communion with the external world." The nature of the connection between the mind and nervous matter is, and must ever be, the deepest mystery in physiology, and one into which the human intellect can never hope to penetrate. There are, however, many actions of the body in the production of which the mind has no share. Of this kind are the nervous actions, which are associated with the functions of organic life, such as digestion, respiration, and circulation. Again, there is another class of actions for which two nerves (an afferent or excitor, and a motor) and a nervous centre are necessary. These are the actions known as *reflex* or *excito-motory*, for the full investigation of which physiology is especially indebted to the labors of the late Dr Marshall Hall. For example, the movement of the œsophagus in propelling the food onwards to the stomach, is caused by the stimulus of the food acting on the excitor or afferent nerves, which, through the spinal cord, excite the motor or efferent nerves, and thus give rise to the necessary muscular action. When the edge of the eyelid is touched, the excitor nerve (a branch of the ophthalmic division of the fifth or trifacial nerve) conveys the impression of the stimulus to the nervous centre, and the eye is at once closed by the motor influence, which is transmitted by a branch of the facial nerve to the orbicular muscle. In such cases as these—and they form a very numerous class—the mind takes no part. In some of them it is conscious of the application of the stimulus, as well as of the muscular act which follows; but even in these cases no effort of the will could modify or interrupt the sequence of the phenomena.

It has been already shewn that the stimuli, by which the action of nerves is commonly excited, are of two kinds, mental and physical, and the change which these stimuli produce in a nerve develops the power known to physiologists as the *vis nervosa*, or nervous force. "The nervous force," says Dr Sharpey, in his "Address on Physiology" in 1869, "has long been likened to electricity, but rather through a vague perception of analogy than from any rigorous comparison. It is true that electric force is developed in the nerves, and even exhibits modifications connected with different conditions of nervous action. Still, it must be borne in mind that the evolution of electricity is a common accompaniment of various processes involving chemical change, whether within the living body or in external nature; and the tendency of recent speculation is not towards the identification of the nerve force with electricity, but rather to suggest that the two stand related in the same way as electricity and other physical forces are related to each other—that is, as manifestations of a common force or energy, of which they, severally, are the special modifications." The velocity with which impressions are transmitted by the nerves has been recently made the subject of investigation, but it is doubtful how far the observations are to be depended on, in consequence of the various sources of fallacy by which such experiments are beset. According to Hirsch, the velocity is 84 metres, or about 112 feet per second in man; while Helmholtz fixes it at 190 feet per second in the frog.

The description of the nervous system given in the foregoing pages is applicable, with slight modifications, to all the Vertebrates; the main differences being in the degrees of the development of the brain—a point which has been already noticed at the commencement of the article BRAIN. For a sufficient notice of the plan of the nervous system in the Invertebrate animals, the reader is referred to the articles ARTICULATED ANIMALS, MOLLUSCA, and RADIATA. It is only in the lowest subdivision of the Animal Kingdom, the PROTOZOA, that no traces of a nervous system can be detected.

For further information on the subject of this article, the reader is referred to Dr Carpenter's works on "Human" and "Comparative Physiology," to Dr Todd's article on "The Nervous System" in "The Cyclopædia of Anatomy and Physiology," to Todd and Bowman's "Physiological Anatomy and Physiology of Man," and to Funke's "Lehrbuch der Physiologie."

NESS (identical with Eng. *nose*, A.-S. *næse*, Ger. *nase*, Ice. *nes*, Lat. *nasus*, Fr. *nez*), a geographical termination, signifying promontory. Names in *-ness* abound among the Orkney and Shetland Islands, and on the Coast of Caithness; and they occur, though less frequently, along the east coast of Great Britain, as far as Dungeness in Kent. As the corresponding Scandinavian termination *-næs* prevails in the names of promontories in Norway, Sweden and Denmark (e. g., Lindsønes, in south of Norway), the existence of names in *-ness* in Britain is held as an evidence of Scandinavian and Danish colonisation. Granez, on the north coast of France, points to the same source.

NESS, Loch, a long narrow lake in Inverness-shire, Scotland, extends north-east and south-west, and is 23 miles in length and  $1\frac{1}{2}$  mile in average breadth. Its north-east extremity reaches a point 6 miles south-west of the town of Inverness. It receives the Morriston, the Oich, the Foyers, and other streams, and its surplus waters are carried off to the Moray Firth by the River Ness. It lies in the valley of Glenmore, and is enclosed by mountain masses averaging 1000 feet in height; but the scenery on its banks is not strikingly picturesque. In many places it is about 120 fathoms in depth, and owing to the length of time which this immense body of water takes to cool down to the freezing-point, ice never forms to any considerable extent.

NEST-BUILDING APES. Reference was made, but with some hesitation in the article GORILLA, to certain new species of apes of the same genus with the chimpanzee and gorilla, said to have been discovered by M. du Chaillu in Western Africa. The complete vindication which has since taken place of that traveller's reputation as a truthful and trustworthy observer, makes it necessary to give some further notice of these now unquestioned discoveries, exceedingly remarkable on account of the habits of some of the animals. To protect themselves from the rain, they construct nests, or rather umbrellas, among the branches of the trees, of long branches and leaves laid one over the other very carefully and thickly, so as to be "capable of shedding water." The branches are fastened to the tree in the middle of the structure by portions of the stems of twining shrubs, abundant in these forests. When the leaves dry, so that the structure no longer keeps out the rain, the owner builds another shelter; and Du Chaillu says this happens once in ten or fifteen days. The nest-building ape (*Troglodytes calvus*, called Nshiego Mbouye by the natives) is nearly four feet in length. Du Chaillu supposes this ape to rest all night on a projecting branch under its nest or umbrella, with an arm round the stem of the tree for security. The nests are generally constructed about 15 or 20 feet from the ground, and invariably on a tree which stands a little apart from others, and which has no limbs below the one in which the nest is placed, probably in order to safety from serpents and other animals. These apes inhabit the most lonely parts of the forests. The nests are never congregated together, so that this ape does not seem to be gregarious. It feeds on fruits.—Du Chaillu discovered a second species of nest-building ape, on his second visit to the Ogobai, very similar to the *Troglodytes calvus*, but which constructs its nest in a somewhat different fashion. It is called Nshiego Nkengo by the natives. It makes its nest or shelter at the height of about 20 or 30 feet from the ground, by beuding over and intertwining a number of the weaker boughs, the foliage of which forms its protection from rain.



Nesselrode  
Nests

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**NESSELRODE**, Karl Rob. Count, one of the most eminent diplomatists of modern times, was born, 14th December 1780, at Lisbon, where his father, a descendant of an ancient noble family on the Lower Rhine, was then Russian ambassador. He early devoted himself to a diplomatic career, gained in a high degree the esteem and confidence of the Emperor Alexander, and in 1818 was one of the representatives of Russia in the important negotiations which took place between the powers who combined against France. In 1814, he accompanied the Russian Emperor to France, and on 1st March signed the treaty of the Quadruple Alliance at Chaumont. He was also one of those who concluded the treaty with Marshal Marmont for the surrender of Paris. He continued to take a principal part in all the negotiations which ended in the Peace of Paris; and was one of the most prominent and active of the plenipotentiaries in the Congress of Vienna. He was one of the most active diplomatists of the Holy Alliance, and accompanied the Emperor Alexander to the Congresses of Aix-la-Chapelle, Troppau, Laibach, and Verona. The Emperor Nicholas reposed in him the same confidence, and under his reign he conducted the Russian policy in the affairs of Greece and Turkey. Amidst the European convulsions of 1848 and 1849, Russia, under his guidance, refrained from interference, till opportunity occurred of dealing a deadly blow to the revolutionary cause in Hungary; and at the same time, of bringing Austria very much under Russian influence. Being one of the chiefs of the German or moderate party in Russia, N. is supposed to have exerted himself strenuously to preserve peace with the Western Powers; and after the war had broken out in 1854, and the ill success of Russia was manifest, he undoubtedly strove for the re-establishment of peace, and for the assembling of a congress to settle all disputes. After the accession of Alexander II. he retired from the direction of foreign affairs, and was succeeded in that department by Prince Alexander Gortchakov, but retained the dignity of chancellor of the empire, and a seat in the ministerial council. He died at St Petersburg, 28d March 1862.

**NESTOR**, according to ancient Grecian legend, the son of Nelus and Chloris, born in the Messenian Pylos, escaped destruction when Hercules slew all his brothers, being then a dweller among the Geronians, with whom he was brought up. He married Eurydice, by whom he became the father of a numerous family. In his youth he was distinguished for valor in war with the Arcadians, Eleians, and the Centaurs, and in his advanced age for wisdom. Although he was an old man when the expedition against Troy was undertaken, he joined it with his Pylians in sixty ships. Homer makes him the great counsellor of the Grecian chiefs, and extols his eloquence as superior even to that of Ulysses. His authority was even considered equal to that of the immortal gods. N. returned in safety to his own dominions after the fall of Troy, along with Menelaus and Diomedes, and continued for long to rule over the people of Pylos.

**NESTORIANS**, a sect of the 5th c., so-called from its founder **NESTORIUS**, under which head their distinctive doctrine, as well as their history up to the time of its condemnation, are sufficiently detailed. Of the later history it will be enough to say that, even after the Council of Ephesus, Nestorianism prevailed in Assyria and Persia, chiefly through the influence of the well-known school of Edessa. Although vigorously repressed in the Roman empire, it was protected, and probably the more on that account, by the Persians, and ultimately was established by King Pherozes as the national church, with a patriarch resident at Seleucia; its fundamental doctrine, as laid down in the synod of Seleucia in 436, being the existence of two distinct persons as Christ, united solely by a unity of will and affection. Under the rule of the califs, the N. enjoyed considerable protection, and throughout the countries of the East their community extended itself. Of their condition in Central Asia during the medieval period, some account will be found under the head of **PRESTER JOHN**. In the middle of the 12th c., their church reckoned no fewer than 90 bishops under regular metropolitans, together with 56 others, whose special dependencies are unknown; but in the destructive career of Tamerlane, they shared the common fate of all the representatives of the eastern civilisation. In the 16th c., a great schism took place in this body, of which a portion renounced their distinctive doctrine, and placed themselves under the jurisdiction of the Roman pontiff, to whom,

under the title of Chaldean Christians, they have since remained faithful. The others still maintain their old creed and their ancient organisation. Their chief seat is in the mountain ranges of Kurdistan. They are at present a poor and illiterate race, numbering about 140,000, and subject to a patriarch residing at Diz (who is always chosen from the same family, and takes invariably the name of Schiamnn, or Simon) and 18 bishops. All these are bound to observe celibacy, but marriage is permitted to the priests and inferior clergy. Their liturgical books recognise seven sacraments, but confession is infrequent, if not altogether disused. Marriage is dissoluble by the sentence of the patriarch; communion is administered in both kinds; and although the language of the liturgy plainly implies the belief of transubstantiation, yet, according to Layard, that doctrine is not popularly held among them. The fasts are strict, and of very long duration, amounting to very nearly one half of the entire year. They pray for the dead, but are said to reject the notion of purgatory, and the only sacred image which they use or reverence is that of the cross. The N. of Kurdistan, like the Christians of the Lebanon, have suffered much from time to time through the fanaticism of the wild tribes among whom they reside. In a massacre in 1843, and again in 1846, many fell victims, and even still they owe much of their security to the influence exercised in their favor by the foreign representatives at the Turkish and Persian courts.

There is another body of N. who have existed in India from the period of the early migrations of the sect, and who are called by the name of Syrian Christians. Their chief seat is in Travancore, where they number about 100,000. Among both bodies of N., European missionaries, Catholic and Protestant, have of late years endeavored to effect an entrance. See Perkins's "Residence of Eight Years in Persia, among the Nestorian Christians" (Audover, 1843); "Anderson's Oriental Churches" (1812); and Dean Stanley's "History of the Eastern Church."

NESTORIUS, a native of Germanicia, a city of Northern Syria, in the patriarchate of Antioch, was probably a disciple of the celebrated Theodore of Moponestia; and having received priest's orders at Antioch, became so eminent for his fluency, if not eloquence, as a preacher, and for grave demeanor and exemplary life, that on occasion of a dispute about the election of a patriarch at Constantinople he was selected by the emperor, in 428 A.D., to fill the vacant see. Soon after his consecration a controversy arose as to the divine and human natures of our Lord, in which N. took a leading part. One of the priests, who followed N. to Constantinople, Anastasius, having in a sermon, which was by some ascribed to N. himself, denied that the Virgin Mary could be truly called the "Mother of God," being only in truth the mother of the man Christ, N. warmly defended Anastasius, espoused his view, and elaborated it into the theory which has since been known by his name, and which equivalently, if not in formal terms, exaggerated the distinction of two natures in our Lord into a distinction of two persons—the human person of Christ and the Divine Person of the Word. An animated controversy ensued, which extended from Constantinople to the other patriarchates, and drew from Cyril, patriarch of Alexandria, a formal condemnation of the doctrine of N. in twelve anathemas still preserved, and a similar condemnation, accompanied by a threat of deposition and excommunication, from Celestine, bishop of Rome, unless he would withdraw the obnoxious doctrine. N. remaining firm in his opinions, a general council was convened at Ephesus in 431, at which Cyril took the most active and prominent part, and in which, notwithstanding the absence of the patriarch of Antioch and his bishops, N. was condemned and deposed. Considerable opposition was offered to this judgment for a time, but ultimately N. was confined in a monastery near Constantinople, whence, after four years, still persisting in his views, he was banished to the Greater Oasis in Upper Egypt, and after several changes of his place of confinement, died in exile. The account given by Evagellus, that his death was caused by a disease in which his tongue was eaten by worms, rests, according to Evagellus himself, on a single and unnamed authority. The more probable narratives ascribe his death to the effects of a fall. The date of this event is uncertain. It was after 439, when Socrates wrote his history ("Hist. Ecc." vii. 84), but there is little doubt that he was already dead in 450, when the Eutychian controversy first began to attract notice.

NESTS (Lat. *nidus*, Gael. *nead*; allied to Ger. *nähen*, Sax. *nestan*, Lat. *nectere*,

to sew, bind, or tie) are the structures which animals prepare for the rearing of their young. They are very different, not only when the creatures which construct them belong to widely separated divisions of the animal kingdom, but often when the animals are of the same class, or even when they are nearly allied; and whilst some construct very simple nests, and those of others are very curious and elaborately framed, some make no nest at all. Among **MAMMALS**, the only nest-builders are certain rodents, as mice, dormice, squirrels, &c. The structures of some of the species are as artfully contrived and as beautiful as the nests of birds. It is among **BIRDS** that nest-making is most general; although there are not a few species which merely scrape a hole in the ground, and many sea-fowls lay their eggs on ledges of naked rock. The situations chosen by birds for their nests are very various, each species affecting some particular kind of situation, as each species also exhibits a uniformity in choice of materials and in form and mode of structure; these particulars, however, being all liable to modification—within certain limits—according to circumstances. Some birds' nests consist merely of a few straws or leaves collected together; some, of such materials as twigs, straws, moss, hair, &c., very nicely interwoven, and often with a lining finer than the framework; some, as those of swallows, are made of clay or other soft material, which hardens as it dries. Birds' nests are generally open at top, but some, as those of swallows, are so placed under a projection of rock or of a building, as to be covered, and have the opening at the side; whilst others are vaulted, and have the opening at the side. Some are situated in holes excavated in clayey, loamy, or sandy banks. The nests of tropic birds, baltimore, weaver-birds, &c., are remarkable for the ingenious contrivance displayed in them; and a very singular nest is that of the tailor-bird, made by sewing together the edges of leaves. These are noticed in the articles on these birds. Many birds are as solitary as possible in their nidification; whilst others, as rooks and herons, congregate in large communities.

No **REPTILES** are known to construct nests; their utmost approach to it being to make a hole for their eggs in sand, or in some other suitable situation.—The nests of **FISHES** have recently attracted much attention of naturalists. It is supposed that the ancients were acquainted with the nest-building instinct of some fishes; but it was unknown to modern naturalists till 1838, when Mr Edwards discovered it in a species of Stickleback (q. v.). It now gives interest to many a fresh-water aquarium. Not many fishes are yet known as nest-builders. Among them are gobies and the goramy. Many are known not to construct nests. The salmon and others exhibit an approach to the nest-building habit, in making a place for their eggs in the sand or gravel which they choose for a spawning-bed.—Many **INSECTS**—a small proportion, however, of the whole number, and mostly *Hymenoptera*—construct nests, as bees, wasps, and ants. The nests of the social bees and wasps are also their ordinary habitations, but the nests of solitary bees are entirely devoted to their young. A few insects, not hymenopterous, as some weevils, may also be said to make nests; but among insects provision for the wants of the young is usually made in very different ways. Certain spiders, amongst which may be named the water-spider, construct nests.—The instinct of nest-making, connected as it is with the instinctive care for their young which the Creator has made so important a part of the nature of so many animals, is by no means an index either of that care or of the affection with which, in many cases, it is conjoined; and some of the animals which construct no nests are among those in which affection for their young is exhibited in the highest degree.—The nest-making instincts of animals seem to be a very essential part of their constitution; and even in the most perfect domestication are still retained and exhibited; although the accommodation to circumstances which is also manifested shews something—and that not inconsiderable—of reason.

**NESTS**, edible, an important article of commerce between the Eastern Islands and China, and of luxury in China, are the nests of several species of Swallow (q. v.), of the genus *Collocalia*. The best known of these birds, *C. esculenta*, is about  $4\frac{1}{2}$  inches in length, 11 inches in expanse of wing, dusky black above, pale ash-color beneath. The nest is shaped like that of the common swallow, and adheres to a rock; vast numbers being found together—often in absolute contiguity—in caves of the Eastern Archipelago; as those of the same and allied species are in other islands of the East Indies. The nests themselves are formed of grass, sea-weed fibres, small leaves, &c., and are attached to the rock by a sort of bracket, made of a

gelatinous substance, which is the part really eaten. This was formerly thought to be made of sea-weeds, but is now known to consist of saliva, which the swallow exudes from the salivary glands under the tongue. The nests are collected by means of ladders, and often by means of ropes, which enable the gatherers to descend from the summit of a precipice, like the rock-fowls of the North. The gathering of the nests takes place after the young are fledged, thrice in a year. In the Chinese market the nests are sold for from £3 to £7 per lb., according to the quality, and they are of course used only by the most wealthy, chiefly for thickening rich soups. The imports at Canton are reckoned at 1200 piculs, or 168,000 lbs., representing about 8,400,000 nests. The nests are very wholesome and nourishing, but quite devoid of the peculiar properties which the Chinese ascribe to them. Five caverns at Carang Bollong, in Java, contain 330,000 swallows, and yield annually about 500,000 nests. The Dutch export them to China. The nests weigh about half an ounce each.

**NETHERLANDS**, The Kingdom of, lies between 50° 43' and 53° 36' n. lat., and 4° 22' and 7° 16' e. long., is bounded on the n. by the North Sea, e. by Hanover and the western part of Prussia, s. by Liège, Belgian Limburg, Antwerp, East and West Flanders, w. by the North Sea. Its greatest length from north to south is 195 English miles, and its greatest breadth from the west, on the North Sea, to the extremity of Overijssel, on the east, 110 English miles. It contains 12,597 square miles. Pop., including the grand duchy of Luxemburg, 3,835,111. The following table gives the population, 1st January 1872, the area of the provinces, including the reclaimed Haarlem Lake, and the provincial capitals:

Provinces.	Area in Sq. Miles.	Pop. 1872.	Provincial Capitals.
North Brabant.....	1960	435,262	's Hertogenbosch.
Gelderland.....	1948	436,029	Arnhem.
South Holland.....	1162	700,499	The Hague.
North Holland.....	1050	591,388	Haarlem.
Zeeland.....	686	181,532	Middeburg.
Utrecht.....	532	175,037	Utrecht.
Friesland.....	1268	300,257	Leeuwarden.
Overijssel.....	1274	256,681	Zwolle.
Groningen.....	896	228,583	Groningen.
Drenthe.....	1017	106,713	Assen.
Limburg.....	840	225,352	Maastricht.
	12,597	3,637,583	
Grand Duchy of Luxemburg.....	987	197,523	Luxemburg.
Total.....	13,584	3,835,111	

The pop. (Jan. 1, 1875) had, exclusive of Luxemburg, increased to 3,715,676, averaging 225 to the square mile. In Drenthe it is 165, and in S. and N. Holland rises to 632 and 591; Utrecht, Limburg, and Zeeland being the next densely peopled. In 1871, the births amounted to 128,306, of which 4599 were illegitimate. The average was 1 to 27.90. In N. Brabant, 1 to 44.38; Gelderland, 1 to 30.04; S. Holland, 1 to 22.72; N. Holland, 1 to 24.23; Zeeland, 1 to 26.80; Utrecht, 1 to 21.43; Friesland, 1 to 36.24; Overijssel, 1 to 45.07; Groningen, 1 to 22.54; Drenthe, 1 to 32.03; Limburg, 1 to 37.44.

The leading places are Amsterdam, Rotterdam, Dordrecht, Alkmaar, Middelburg, Schiedam, Leyden, Delft, Gouda, Utrecht, Amersfort, Groningen, Meppel, Zwolle, Kampen, Deventer, Arnhem, Nymegen, Tiel, Gorinchem, 's Hertogenbosch, Tilburg, and Breda.

**Physical Aspect.**—The land is generally low, much of it being under the level of the sea, rivers, and canals, especially in North and South Holland, Zeeland, the southern part of Gelderland, and Friesland. Along the west coast, the low lands are protected from the sea by a line of sand-hills or dunes; and where that natural defence is wanting, strong dykes have been constructed, and are maintained at

great expense, to keep back the waters. The greatest of these dykes are those of the Helder and of West Kapelle, on the east coast of Walcheren (q. v.), which require, each, upwards of £6000 annually to keep them in order. Engineers, called the officers of the Waterstaat, take special charge of the dykes and national hydraulic works, the expense of which is reckoned at about half a million sterling. A hilly district stretches from Prussia through Drenthe, Overijssel, the Veluwe or Arnhem district of Gelderland, the eastern part of Utrecht, into the Betuwe or country between the Maas and the Waal. This tract of country has many pretty spots, is of a light sandy soil, well watered, and when not cultivated, is covered with heath or oak-coppice. The greatest part of the N. is very fertile, the low lands and drained lakes, called Polders (q. v.), being adapted for pasturing cattle, and the light soils for cereals and fruits; but in some districts there are sandy heath-clad plains, extensive peat-lands, and undrained morasses, which industry is rapidly bringing under cultivation.

*Islands, Rivers, Canals, &c.*—The islands may be divided into two groups, of which the southern, formed by the mouths of the Schelde and Maas, contains Walcheren, South and North Beveland, Schouwen, Duiveland, Tholen, St Philipsland, Goeree, Voorne, Putten, Beyerland, Ysselmonde, Rozenburg, and the island of Dordrecht. The northern group contains the islands at the entrance of the Zuider Zee and along the coasts of Groningen and Friesland, as Wieringen, Texel, Vlieland, Terschelling, Ameland, Schiermonnikoog, and Rottum. In the Zuider Zee are Marken, Urk, and Schokland.

The chief rivers are, the Rhine, Maas, and Schelde. Important branches of these are the Waal, Lek, Yssel, Roer, &c.

Water-ways are more numerous than in any other European country, the immense tracts of meadow-land and the fertile polders being girdled by large canals, and cut in all directions by smaller ones for drainage and communication. Those of most importance to the national trade are, the North Holland Canal, constructed 1819—1825, to connect the port of Amsterdam with the North Sea; the Voorne Canal, from the north side of Voorne to Hellevoetsluis, which shortens the outlet from Rotterdam; the South Willemsvaart, through North Brabant, Dutch and Belgium Limburg, from 's Hertogenbosch to Maastricht, being  $71\frac{1}{2}$  English miles in length, and having 24 locks. Besides these, there are numerous important canals, connecting rivers, and cutting the kingdom into a net-work of water-courses. To improve the entrance to the Maas, the Hoek of Holland has lately been cut. A new canal through the Y and peninsula of Holland, was opened, Nov. 1, 1876. It is nowhere less than 90 yards broad, with sluices nearly 400 feet in length, and a depth of nearly 23 feet. This has reduced the distance from Amsterdam to the sea to about 16 miles, and provides a safe way for large ships. The harbor, in  $52^{\circ} 29'$  n. lat. and  $4^{\circ} 36'$  e. long., is formed by piers of concrete built into the North Sea. The expense, including the recovery of 15,000 acres of sand from the Y, amounted to about two millions sterling.

Railways have been constructed to the extent of about 1095 miles, forming lines of communication between the principal cities of the N., and with Prussia to the south-east, and Belgium to the south-west. The receipts of the three main lines in 1872 amounted to £696,535. These belong to companies. The state railways realised £445,966, and carried 8,188,443 passengers. The two oldest companies gave dividends of  $6\frac{1}{2}\%$  and  $8\frac{1}{2}\%$  per cent.

*Climate, Agriculture, Produce, &c.*—The climate of the N. is variable, chilly colds often closely succeeding high temperatures, inducing various forms of fever and ague, and requiring peculiar care as to clothing, &c. In summer, the thermometer sometimes rises above  $80^{\circ}$ , and even to  $90^{\circ}$  F. in the shade, and a winter of great severity usually occurs every fifth year, when carriages and heavily-laden wagons cross the rivers and the Y on the ice, and thousands enjoy the national pastime of skating.

The farms are generally small and well cultivated, though the implements are old-fashioned and clumsy. Much progress is being made in reclaiming the sandy wastes, in Drenthe and Overijssel, by planting them with fir and oak, and sowing black-wheat, oats, and rye. The best implements are also being gradually introduced from England, and the steam-plough was, in 1862, put in operation on the lands of the

drained Haarlem Lake. The following table shows the agricultural products, with their values, for 1872, according to government returns:

Wheat to the value of.....	£2,843,500
Rye.....	4,422,750
Barley.....	1,092,833
Oats.....	2,217,500
Beans.....	650,250
Pease.....	436,416
Buckwheat.....	815,583
Colza.....	675,666
Potatoes.....	4,309,916
Madder.....	277,583
Chicory.....	69,666
Flax.....	903,000
Hemp.....	45,833
Beet.....	398,666
Tobacco.....	169,153
Various.....	21,849
Total.....	£19,340,164

In 1874 the total value of agricultural products was about £17,500,000. In 1872, wheat occupied 211,969 acres; rye, 493,689 acres; barley, 111,811 acres; oats, 246,651 acres; potatoes, 812,329 acres; flax, 46,846 acres.

In 1872, the N. possessed 247,900 horses, 1,377,000 head of cattle, 855,300 sheep, 129,500 goats, and 320,100 pigs. The leading agricultural products of Zeeland are wheat and madder; in South Holland, madder, hemp, butter and cheese; in North Holland, butter and cheese are extensively made, and cattle, sheep, and pigs reared and exported. The horses of Friesland, Zeeland, and Gelderland are of first-rate quality. The exportation of butter from Holland and Friesland, and of Edam, Leyden, Gonda, and Frisian cheese is large; in 1873 the value of the exports of cheese was £1,018,238, of butter, £1,463,875. Fruit is abundant, and in several provinces, as Gelderland, Utrecht, and Drenthe, much attention is paid to bees. In Haarlem and neighborhood, tulips and hyacinths are much cultivated, realising a large annual amount. In 1874, the foreign trade in bulbs reached, in the district, £37,500. The inland sales realised £47,833. Wild ducks, snipes, plovers, and hares are plentiful; and there are also conies, partridges, pheasants, and deer—game forming an article of export.

*Geology, Mineralogy, &c.*—The N. are of recent formation, and consist of an alluvial deposit, chiefly of a deep, rich clayey soil, superimposed on banks of sand, marine shells, and beds of peat and clay. It appears that at some distant period there had been a depression of the land below its former level, enabling the sea to burst through its sand-banks, submerge the land, and form new deposits. The higher districts are composed of sand-drift, mingled with fertile earth, and resting on a bed of clay. Coal is worked in Limburg; and a soft sandstone, which becomes fit for building purposes after having been some time exposed to the atmosphere, is quarried in the southern part of that province, which has also pipe and other clays. Valuable clays for pottery, tile and brick making, abound in the various provinces.

*Manufactures, Industries, &c.*—The chief manufactures are linen, woollen, cotton, and silk fabrics; paper, leather, glass, &c. Leyden and Tilburg are famed for woollen blankets, wool-dyed pilot, dune cloths, and friezes; 's Hertogenbosch for linens and rich damasks; calicoes, shirtings, drills, tablecloths, striped dimities are made at Almelo, Amersfort, and in the leading towns of Overysel. Good imitation Smyrna and Scotch carpets, and carpets of hair and wool, are manufactured at Deventer, Delft, Arnhem, Hilversum, Utrecht, and Breda; Turkey-red yarns, dyed silks, and silk stuffs at Roermond, Utrecht, Haarlem, &c.; leather, glass, firearms, at Maastricht and Delft; iron-founding, rolling and hammering of lead and copper, cannon-founding are carried on at the Hague, &c.; and powder-mills at Mulden; Oudenkerk, Middelburg, 's Hertogenbosch, Amsterdam, Nymegen, &c., have important breweries, those of 's Hertogenbosch and Amsterdam manufacturing very

large quantities. Waalwyk, Henæden, and surrounding districts, manufacture boots and shoes, of which Heusden sends to North and South Holland 1,000,000 pairs yearly. Gin is distilled at Schiedam, Delft, Rotterdam, and Weesp. Amsterdam has the largest diamond-cutting trade in the world, 10,000 persons depending on that branch of industry. Sugar-refining is largely carried on at Amsterdam, Rotterdam, and Dordrecht, from all of which sugar is exported to Russia, the Levant, and countries of Europe. Paper is chiefly made in Holland and Gelderland. The leading letter-type foundries are at Amsterdam and Haarlem. Manufactures of every kind are being rapidly increased in number, and adding to the material prosperity of the Netherlands. The chief motive power is the windmill, which forms a never-failing element in the scenery; but of late years, steam is becoming more general. In 1854, the steam-engines employed in factories were 464, with 7980 horse-power; and in 1872, they amounted to 1822, of 21,403 horse-power, and the increase has since been going on.

Many people are employed in the immense inland shipping-trade which the canal network has fostered, there being, when the previous census was taken, 6,634 ships inhabited by families, or one inhabited ship to 81 houses. The houses were 542,325; families, 668,911. Fishing, not only in the inland waters, the coasts, and bays of the North Sea, but also on the coast of Scotland, is vigorously pursued. In 1873, the total value of the herrings taken in the North Sea was £127,660, 103 vessels having been employed; on the N. coasts, to the value of £77,784; and in the Zuider Zee and coasts were taken 87,831,960 herrings. The anchovy trade, almost exclusively in the Zuider Zee, amounted to 80,000 ankers, valued at about £58,750. There are productive oyster beds, besides extensive fishings of cod, ling, turbot, flounders, soles, shrimps, haddock, &c.; and from the rivers, salmon, eels, perch, &c.

*Exports, Imports, Shipping, &c.*—The N. is peculiarly a mercantile as well as agricultural country; its merchants not only importing and exporting the products of their colonies and the surplus of their own country, but also those of other lands. The general imports (1875) were 6,520,217 tons; exports, 3,200,941 tons. The value of goods imported for use was £59,890,520, and of exports, £44,914,242, home produce; both less than in 1873. The leading exports are: cheese, butter, refined sugar, flax, cattle, sheep, pigs, gin, garancine, &c.; the imports, manufactured goods, unrefined sugar, coffee, grain, iron, yarns, cotton, rice, gold, silver, tin, tea, indigo, silk and woollen fabrics. The trade with Great Britain is large and varied, and carried on chiefly by steam vessels.

In 1876, the laden ships which cleared in-bound amounted to 11,009, having a tonnage of 4,762,331; those in ballast being 571 ships, of 204,165 tons. Of the laden vessels, 2877 were Dutch, of 1,119,547 tons. Cleared out-bound, laden, 8029 ships, of 3,859,580 tonnage; in ballast, 3779, of 1,661,012 tons burden. The trade along the rivers, by Belgian and German ships, is large. In 1873, the goods passing up the Rhine amounted to 844,191 tons, and from Germany down, 1,533,060. This trade consists largely of grain, timber, and coal. Wheat carried up, 110,263 tons, and rye, 116,774 tons; down, 4854 tons of wheat, and 10,835 of potatoes. Timber, upwards, 86,042 tons; downwards, 56,087 tons. Coal, 1,028,119; and iron, 31,119 tons.

*Religion, Language, Education, &c.*—At the last census (1860) there were 2,192,351 Protestants, 1,813,052, Roman Catholics, 68,003 Jews, and 5193 to small sects. There were (Jan. 1, 1875) 2034 Protestant ministers, of whom 1598 were Dutch Reformed; 2062 Roman Catholic priests; and 163 Jewish congregations. The budget of 1875 contained £119,979 for the Dutch Reformed Church; for the Roman Catholic, £49,879; and the Jews, £2966.

There are five dialects spoken respectively in Groningen, Friesland, Gelderland, Holland, and Zeeland. These differ considerably from each other, and the Frisian is not at all understood by natives of the other provinces. The written language is the Dutch, that branch of the great Teutonic stock which preserves more of its original character than the rest of the same family. It possesses numerous words the same as Lowland Scotch, and bears a strong affinity to the Old Saxon English, as the following Dutch proverb shews:

Als de wyn is in den man,  
Is de wysheid in de kan.

The kingdom of the N. has produced many great names in all branches of litera-

ture and science. Coester (q. v.), according to his countrymen, invented printing, Leeuwenhoek the microscope, and Huygens applied the pendulum. Out of a long list of distinguished names, may be mentioned those of Erasmus, Scaliger, Helmsius, Hugo de Groot (Grotius), Huygens, Leeuwenhoek, Vitringa, Boerhave, and the poets Hooft, Vondel, and Cats; whilst the writings of Van der Palm, Van Lennep, Des Amorie van der Hoeven, Haafuer, Stuart, Van Kampen, and those of the poets Bilderdijk, Da Costa, De Bull, Van den Berg, ter Haar, and Hofdyk, shew that literature is not wanting. Exclusive of newspapers, there are 236 magazines and periodicals published in the N., of which 67 are religious, 42 on art, belles-lettres, and general literature, and 7 on antiquity, history, &c. Leading painters of the old Dutch school were Rembrandt, Gerrit (Gerard) Dou, Gabriel Metz, Jan Steen, Paul Potter, Ruydaal, Van der Helst; and among those of the present century, Ary Scheffer, Koekkoek, Schelfhout, Pleuneman, Kruseman, Van Os, Craeyvanger, ten Kate, Israels, Bles, Louis Meyer, Roeloff, Springer, &c., have distinguished themselves.

There are universities at Leyden, Utrecht, and Groningen; *atheneums* or colleges at Amsterdam, Deventer, and Maastricht, the students attending which must be examined for degrees at one of the universities. Latin schools are in all the leading towns. The universities and *atheneums* have faculties of theology, medicine, philosophy, law, and letters. There are also the Royal Military and Naval Academy at Breda, and that for engineers and the India civil service at Delft; seminaries in several places for the training of the Roman Catholic clergy; and others, especially in Amsterdam, for those of the smaller Protestant sects; and many literary, scientific, and agricultural institutes.

Each community or parish must have, at least, one elementary school, supported from the local public funds, in which reading, writing, arithmetic, history, geography, &c., are taught. A higher class of schools includes also foreign languages. All are under government inspectors, and the teachers must undergo stringent examinations on all the branches before obtaining permission to teach. Many society or subscription schools are being erected all over the land, with a normal school at Nymegen, not under government surveillance, and including religious instruction, which is excluded from the national public schools. The members of these societies pay a yearly subscription and a small fee for each pupil sent by them to the school, a select number acting as managers. There are national normal schools at 's Hertogenbosch, Haarlem, and Groningen, the pupil-teachers boarding themselves, and receiving, at 's Hertogenbosch, £21 a year, and at Haarlem, £24. The attendance at school is about 1 to 8 of the population in winter, and 1 to 10 in summer. In January 1872, 268,490 boys and 225,779 girls; in July, 287,685 boys and 218,728 girls were at public and private elementary schools, with 8838 male and 2251 female teachers.

*Army, Navy, &c.*—The strength of the army, in Europe (1878) was 2060 officers and 60,850 men; of the Indian army, 1430 officers and 37,900 men. It is composed of volunteers, and of one man for every 500, drawn by lot for five years' service. There is also a local force, called the Schutterij, drawn by lot from those between 25 and 34 years of age, to assist in keeping order in peace, and in case of war, to act as a mobile corps, and do garrison duty. If attacked on the land-side, 90,000 men are required for the defences, and if by land and sea, 106,000. The first, or Maas line of defence, if formed by Maastricht, Venlo, Grave, 's Hertogenbosch, Woudrichem, Geertruidenberg, Willemstad, Breda, and Bergen-op-Zoom. The second line is formed by Nymegen, Forts St Andries and Loevestein and Gorinchem. The inner line of Utrecht is formed by various forts from Naarden, Utrecht to Gorinchem, which, by inundations, can make the provinces of North and South Holland into an island. There are many other forts, batteries, and strengths at the mouths of the rivers and along the leading ways, and a new line of defence was agreed upon in 1874.

The royal navy consisted (July 1, 1878) of 99 steamers carrying 400 guns, and 16 sailing vessels with 103. The sailors and marines numbered 8470 officers and men, including 701 native East Indians. A large double-turret ship, with four 35-ton Armstrong guns, was added in 1876 to the iron-clads. Prince Frederic, nunc of the king, is admiral; the Prince of Orange, vice-admiral; and his majesty is commander-in-chief of the land and naval forces.

*Revenue, Expenditure, &c.*—The revenue of 1878 was estimated at £8,539,530, and the expenditure at £9,849,941, the difference to be met from accumulated surpluses and the regular increase. The principal receipts are from direct taxes, excise, in-



direct taxes, import and export dues. Among items of expenditure are £983,300 for public works, chiefly railways; £1,250,000 for interest of the national debt; and £338,300 to improve the defences. The India revenue for 1878 was estimated at £12,000,478; the expenditure equals the revenue. The East India colonies, which were a burden in the earlier years of the kingdom, have long been a source of profit.

From 1850 to and with 1874, there has been paid off £25,874,218 from the national debt, lessening the annual interest by the sum of £784,709. The interest payable on the debt amounted in 1879 to £2,325,000. The material prosperity of the N. is rapidly increasing, and a sum of probably not less than 300 million pounds is invested by N. capitalists in the funds of other nations.

The chief colonies are Java, Sumatra, Borneo, Celebes, the Spice Islands, and Papua or New Guinea, in the East; and Surinam, Curacao, and its dependencies, in the West Indies, with factories on the coast of Guinea. Colonial pop. estimated at 24,886,991.

*Government, Franchise, &c.*—The government of the N. is a limited constitutional monarchy, hereditary in the male line, and by default of that in the female. The crown-prince bears the title of Prince of Orange, and attains his majority at 18, when he takes his seat in the council of state. The executive is vested in the king, with a council of state composed of twelve members, nominated by his majesty, and the ministers of the Interior, Foreign Affairs, Finance, War, the Colonies, Marine, and Justice, the last-named taking charge of ecclesiastical affairs through two administrators, or under-secretaries of state, for the Protestant and Roman Catholic Churches. The legislative power is shared by the king and the two chambers of the States-general; the first chamber having 89 members, elected for nine years, by the provincial states, one-third of their number retiring every three years. The second chamber has 80 members chosen by electors numbering, in 1874, 108,813, above 23 years of age, who pay from £1. 14s. to £18. 12s. of direct taxes, according to the size and importance of the electoral district. These are elected for four years, one half of the chamber retiring every two years. For members of the town-councils, the electoral qualification is half the above sum. The members of both chambers must be 30 years of age before the day of election, and those eligible for the first chamber are the nobility. This exceedingly high franchise, which, in Amsterdam, is a higher direct tax than the rental qualification of Great Britain, makes an election a thing of no interest except to a few. In 1871, only 88.2 per cent. of the electors of North Holland gave their votes, and the maximum in any place was 66.9 per cent. In Limburg, 69.5 in North Brabant, the average being 46.4.

The king nominates the governors of provinces, the burgemeesters of every city, town, or village, and a host of other officials. The cities, towns, and rural parishes are governed by a council, burgemeester (mayor or provost), and wethouders (aldermen or bailies). The council consists of from 7 to 39 members, according to the population, who are chosen for six years, one-third part retiring every two years. The council selects out of their number from 2 to 4 wethouders for six years, one-half retiring every third year. These with the burgemeester, form the local executive. The law departments are the High Council, the provincial courts of justice, those of the arrondissements and cantons; appeal in many cases being open from the lower to the higher courts.

*History.*—Nothing is known regarding the original inhabitants of the N.; but about a century and a half before our era, the people known as the Batavi came out of Hesse, where they were living in hostility with their neighbors, and settled down between the Rhine and the Waal. At this time, the Frisians occupied the country north of the Rhine to the Elbe. The Batavi and Frisians differed little in appearance, manner of life, and religion. They clothed themselves with skins, lived by fishing, hunting, and pasturing cattle, possessing horses, cows, and sheep; were faithful, open-hearted, chaste, and hospitable. The songs of the bards composed their literature and history. Warlike and brave, they selected their leader for his courage and prowess, were armed with the bow and a short spear. They worshipped the sun and moon, and held their meetings in consecrated woods.

The Romans having subdued the Belgæ, next attacked the Frisians, who agreed to pay a tribute of ox-hides and horns, but continued restless and rebellious. The Batavi became allies of Rome, paying no tribute, but supplying a volunteer contingent, chiefly of cavalry, which decided the battle of Pharsalia in favor of Cæsar, and

formed a gallant band of the Roman armies in all parts of the empire. About 70 A.D., Claudius Civilis, a Batavian, whose original name has not been preserved, made a bold effort to overthrow the Roman power in Rhenish or Germanic Gaul, but he was finally compelled to sue for peace. Towards the close of the 3d c. began the invasions of the Franks, followed by the Saxons and other races; and in the 5th c., the Batavi had ceased to exist as a distinct people. The Franks continued to spread, and with them the Christian religion, Dagobert I., one of their princes, erecting a church at Utrecht, which, 695, became the seat of a bishopric. The Frisians were opposed to, and the last to embrace, Christianity, to which they were forcibly converted by Charles Martel. At the end of the 8th c., all the Low Countries submitted to Charlemagne, who built a palace at Nymegen, on the Waal. The feudal system now began to develop itself and expand into dukedoms, counties, lordships, and bishoprics, which the dukes, counts, and bishops, especially the counts of Holland and bishops of Utrecht, endeavored to enlarge and to rule over with as little submission to their superior as possible. The Crusades weakened the power and drained the resources of the nobles and priesthood, so that, during the middle ages, cities began to assume importance, strengthen themselves with walls, choose their own rulers, and appear in the state meetings. In 1384 the county of Flanders passed, through marriage, to the Duke of Burgundy, whose grandson, Philip the Good, made it his special life-effort to form the N. into a powerful kingdom. He bought Namur, inherited Brabant with Limburg, and compelled Jacoba of Bavaria to resign Holland and Zeeland. Charles V., as heir of the house of Burgundy, inherited and united the N. under his sceptre, and the country attained to prosperity, through the encouragements which he gave to commerce and shipping. Philip II., who succeeded his father, 1555, by his harsh government and persecution of the Reformers, excited the N. to rebellion, which, after a struggle of 80 years, resulted in the firm establishment of the Republic of the United Provinces. The founder of the independence of the N. was William of Nassau, Prince of Orange, called in history the Silent, who freely sacrificed his own property, and put forth every effort to unite the discordant states of the South with those of the North in resisting the Spanish yoke. Retiring to Holland, and banding together several provinces for mutual defence, by an agreement made at Utrecht, 1579, he perseveringly opposed the efforts of Spain; and in 1609, the independency of the United Provinces (the boundaries of which nearly coincided with those of the present kingdom of the N.), was virtually acknowledged by the Spanish king, an armistice for twelve years being signed at Antwerp, April 9 of that year. The struggle was renewed and carried on till 1648, when all the powers acknowledged the independence of the United Provinces by the treaty of Munster, while the Belgic provinces, divided among themselves, remained submissive to Spain and to the Roman Catholic Church.

Prince William the Silent did not live to see his efforts for freedom crowned with success. Excited by religious fanaticism, and the hope of a great reward, Balthazar Gerard or Guion, 1584, shot the prince in his house at Delft, from a narrow passage, as he was stepping from the dining-room to ascend an adjoining stair which led to the second floor. With the 17th c., the United Provinces began to advance in power and wealth, their ships visiting all parts of the world. Meanwhile, the contest between the Arminians and Calvinists broke out, and raged with fury for many years; Grotius and others fleeing to other lands, and the statesman Oldenbarnevelt suffering on the scaffold at the age of 72. The United Provinces were presided over by the Princes of Orange till the troubles at the end of the 18th c. began the long European war, which the battle of Waterloo brought to a close. The National Convention of France having declared war against Great Britain and the Stadtholder of Holland, 1798, French armies overran Belgium, 1794; and being welcomed by the so-called patriots of the United Provinces, William V. and his family, January, 1796, were obliged to escape from Scheveningen to England in a fishing junk, and the French rule began. The United Provinces now became the Batavian Republic, paying eight and a half millions sterling for a French army of 25,000 men, besides giving up important parts of the country along the Belgian frontier. After several changes, Louis Bonaparte, 5th June, 1806, was appointed king of Holland, but, four years later, was obliged to resign because he refused to be a mere tool in the hands of the French emperor. Holland was then added to the Empire, and formed seven departments. The fall of Napoleon I., and dismemberment of the French Empire, led to

the recall of the Orange family, and the formation of the Southern and Northern Provinces into the ill-assorted Kingdom of the N., which in 1830 was broken up by the secession of Belgium. In 1839, peace was finally concluded with Belgium; but almost immediately after, national discontent with the government shewed itself, and William I., in 1840, abdicated in favor of his son. The N. being moved by the revolutionary fever of 1848, King William II. granted a new constitution, according to which new chambers were chosen, but had scarcely met when he died, March 1849, and the present king, William III., ascended the throne. The nation is prosperous, and on the 11th May 1874, the twenty-fifth anniversary of the present king's reign was celebrated with great rejoicings.

A bill for the emancipation of the slaves in the N. West India possessions passed both chambers, 8th August 1862, and received the royal assent. It decreed a compensation of 300 guilders for each slave, except those of the island of St Martin, who were to be compensated for at 30 guilders each. The freed negroes may choose the place to labor, but must be able to satisfy the government officers that they are employed somewhere. This surveillance to continue during ten years. The law came into force 1st July 1863, and in Surinam and all the other colonies the day passed quietly over. Those, however, interested in agriculture have sent an address to the master of the colonies, protesting against the high-wages tariff as hostile to the successful carrying on of their operations. The rate, however, is not higher than the planters in the neighboring British colony of British Guiana are accustomed to pay. In the budget for 1863, provision was made for the extraordinary expenses connected with the emancipation to the amount of £1,065,366, of which £367,000 as compensation for the slaves of Surinam, and £21,250 as premiums for free labor. For Curacao and its dependencies, £168,090 of compensation money, fully £12,000 being for various other outlays connected with the change. The number of slaves set free may be stated in round numbers to be 42,000, of whom 35,000 are in Dutch Guiana.

On 16th July 1868, a treaty was signed at Brussels by all the naval powers for the buying up of the toll levied, under treaty arrangements, by the king of the N., on vessels navigating the Schelde (q. v.), the king of Belgium blinding himself also to reduce the harbor, pilot, and other charges on shipping within that kingdom.

The N. have suffered much from floods, either caused by the breaking in of the sea, or by the descent of masses of water from Germany, while the rivers of the Rhine delta were blocked up with ice. The Zuider Zee (q. v.), which contains 1865 square miles, was of trifling extent till the flood of All Saints' Day, 1247, when the North Sea swallowed up a large tract of country. In 1277, the Dollart Gulf, in Groningen, was formed at the mouth of the Ems, by floods in the spring and autumn of that year, which destroyed 83 villages and 100,000 people. The immense waste of waters, known as the sunken South Holland Waarde, or Biesbosch, arose out of the breaking of one of the dykes, 1421, by which 72 villages were laid under water, only 84 of them reappearing. In modern times, great floods, but fortunately with only temporary results, have occurred in 1809, 1825, and 1856. That of 1856, which placed the town of Veeneendaal, in Gelderland, and an extensive tract of country under water, was caused by a rapid thaw in the high lands of Germany pouring down torrents of water into the N. while the rivers were ice-locked after a winter of unusual severity.—See the "Algemeene Statistiek van Nederland;" "Nederlands-Geographisch-Historisch Overzicht," by Luit. L. G. Bemaar; "Statistiek Jaarboek" (Witkamp, Amsterdam), an excellent book of reference, which is published yearly up to the present time; the "Provincial Annual Reports," &c.

NETHERLANDS TRADING COMPANY, a chartered joint-stock association, with limited liability, formed to aid in developing the natural resources of the Dutch East Indian possessions. The Company possesses peculiar privileges, acting exclusively as the commission-agents of the Netherlands government in importing and selling the produce of the colonies, as well as doing a large business as merchants. Private enterprise having failed to develop the trade of Java, after that island was restored to the Netherlands, King William I. in 1824, erected the Trading Company, with a capital of upwards of 8 millions sterling, not only becoming a large shareholder, but guaranteeing an interest of 4 per cent. on the paid-up capital. The early transactions were unprofitable, and in 1827 the king had to pay a part, and in 1830 the whole of the guaranteed interest. From that date, it has prospered and handed over, from the trade of Java (q. v.), large surplus balances into the

national revenue. The head office of the directors is at Amsterdam, with agents at Rotterdam, Middelburg, Dordrecht, and Schiedam; the principal factory at Batavia, with agencies at the chief ports in Java and the other Netherlands possessions in the Eastern Archipelago. Formerly the company sent large quantities of goods to the colonial markets for the account of the Dutch government; but since the beginning of 1875, the business for the government has been confined to colonial produce, which is placed in factories, forwarded to Holland, and disposed of at the company's sales in Amsterdam, Rotterdam, &c. In 1875, they sold for the government 756,959 bales of coffee, which realised £4,878,292; 136,768 blocks of Banca and 256 of Billiton tin, at £376,548; 493 packages of cinchona bark and powder at £4077. On the company's account, colonial produce was sold to the value of £161,367; and calicoes, yarns, woollen stuffs, various goods, precious stones, and money, to the value of £214,638, were sent to Netherlands-India, Singapore, British India, China, Japan, and Surinam. The company also advance money to planters and manufacturers in the colonies, who bind themselves for a number of years to consign their produce. They are also owners of a large sugar plantation, Resolutie, in Surinam. The present capital is 36,140,000 guilders, or £3,011,666. The commission paid by government is a chief source of profit. For 1875, the net gain was £190,354, from which the shareholders received 5-4-5 per cent. The result would have been more favorable had not heavy loss been sustained in the Japan trade.

The success of the Trading Company depends mainly on the culture system, which was introduced into Java in 1830. Under the native rule, the land belonged to the princes, and the cultivators paid one-fifth of the produce, and one-fifth of their labor as ground-rent. The Dutch, by conquest, are now the proprietors of the greater part of the island, and exact the old produce rent, relaxing the labor to one-seventh, and causing the holders of crown-lands to plant one-fifth of their cultivated fields with the crop best adapted for the soil and required for the European market. The government also has supplied, free of interest, enterprising young men with the capital necessary to erect and carry on works for the preparation of the raw materials, to be repaid in ten yearly instalments, beginning with the third year. The landholders of a certain district allotted to a sugar-mill were bound to supply a fixed quantity, receiving advances upon the crop to enable them to bring it forward. The rule of fixed quantity was relaxed in 1860, and has caused great discontentment among the contractors. The European residents and their assistants, the native princes, chiefs, and village head-men, receive a percentage according to the quantity which is manufactured from the produce delivered, so that all are interested in taking care that the lands are cultivated and the crops cared for. Sugar, tobacco, and tea are prepared by contractors; indigo, cochineal, coffee, cinnamon, and pepper by the natives under European surveillance, all passing into the Trading Company's factories for shipment to the Netherlands. The objections to the system are, that it does not leave the labor of the natives free, and that the passing of so much of the export and import trade through one favored company injures the general merchant. On the other hand, it must be said that the Dutch government only carries out the old law, and it is therefore not regarded by the peasantry as an infringement of their rights; and the merchants and capitalists of the Netherlands did not of themselves put forth sufficient efforts to work out the natural capabilities of Java when it returned under Dutch rule.

NETLEY, Royal Victoria Hospital at, is a superb building, on the shore of Southampton Water, for the reception of invalids from the army on foreign service, and from among the troops serving in the adjoining military districts. In times of peace, it is only necessary to use a portion of the vast structure; but in the event of a European war, in which the British army should take part, the exigencies of the service would probably tax its accommodation to the utmost. There is provision for 1000 patients, with power to increase the number if necessary. The medical staff of course varies in proportion to the work to be done; but at present it consists of a governor, an adjutant, a paymaster, an assistant-commandant, and medical officers, and officers of orderlies of various ranks. The total cost of the construction of this hospital, which was commenced in 1855, has been about £350,000. Attached is the Medical School for candidates for the army medical department, the students having the best means of practical instruction in the wards of the hospital. N. is also the headquarters of the female nurses of the army, who are under the con-

trol of a lady stationed here as superintendent. Complete arrangements have been made for the landing of wounded men in front of the hospital, and for conveying them thither with the least disturbance. There is no doubt as to the convenience of this great hospital for its purposes; but some questions have been raised, under high sanitary authority, as to the salubrity of the site, adjacent as it is to the wide banks of mud which Southampton Water uncovers at low tide.

NETS are fabrics in which the threads cross each other at right angles, leaving a comparatively large open space between them; the threads are also knotted at the intersections. In this respect, netting differs essentially from weaving, where the intersecting threads simply cross each other. The open spaces in nets are called *meshes*, and these correspond in size with an instrument used in net-making, consisting of a flat piece of wood or other hard substance, usually about the shape and size of a common paper-knife. In addition to this, a peculiar kind of needle is used, upon which a large quantity of the thread is placed, by winding it from end to end between the forked extremities; the holes are used to insert the end of the thread, to prevent it slipping off at the commencement of the winding. The art of net-making has been practised from the earliest times by the most savage as well as the most civilised nations. Even where the art of weaving was quite unknown, as in some of the South Sea Islands when first discovered, that of netting was well understood; and it is easy to see that the human race could not help learning the value of this art from seeing how frequently land and water animals get entangled in the shrubs and weeds through which they attempt to pass; hence we find amongst savage tribes, almost universally, nets are used not only for fishing, as with us, but also for entrapping land animals. We have ample illustrations of the uses of nets for both purposes in the bas-reliefs of Assyria, Greece, and Rome, and in the mural paintings of Egypt.

Until recently, nets have been always made by hand, and generally the thread has been a more or less thick twine of hemp or flax, the thickness of the twine and the size of the mesh depending upon the kind of fish for which it was made; recently, however, great improvements have been made in the manufacture of nets, and machinery of a most beautiful automatic kind has been introduced by Messrs Stuart of Musselburgh, whose manufactory is of vast extent. This establishment commences with the raw materials, which are hemp, flax, and cotton, the last having been extensively employed for herring and sprat nets of late years. Hemp, however, is the chief material for net-making; and in order to prepare it, it is first passed in long rolls through a machine consisting of two rollers with blunt ridges, the upper of which is kept down on the material by means of a hanging weight, consisting of a loaded box suspended to a chain from the axle of the roller. After the fibre has passed through this, it is much more supple than before, and is then *hackled*; this process is also done by machinery, which was first introduced into this manufactory for hemp-hackling, and succeeds admirably. It subsequently passes through the carding, roving, and spinning processes, as in all other kinds of yarn, and is finally twisted into threads or twines of the required thickness. Messrs Stuart have in one room 4000 spindles at work, besides the carding and twist machines. Of their patent loom they have 200 at work, the largest of which make nets 480 meshes in width. It would be useless to attempt to describe these ingenious looms, which are worked by hand, otherwise than by saying that their leading features are like the stocking-frames; a series of sinkers push forward, pull down, and pass in and out the thread, which is carried from one side of the web to the other by long iron needles, which act as shuttles passing not over-quickly from a long box on each side of the loom. This simple yet most effective contrivance is worked by wheels and jointed rods, and might be advantageously applied to many other purposes. After the net comes from the loom, it goes to the finishers, who, by hand, make the addition of a kind of selvage, consisting of several thicknesses of twine, to give strength to the edges. The nets are then ready for use, and are sent in vast numbers to all parts of the world. Machine net-making is now becoming general.

A great variety of nets are in use amongst fishermen, but the principal are the *seine*, *trawl*, and *drift-net*. The seine is a very long but not very wide net, one side of which is loaded with pieces of lead, and consequently sinks; the other, or upper, is buoyed with pieces of cork, and consequently is kept up to the surface. Seines

are sometimes as much as 190 fathoms in length. When stretched out, they constitute walls of network in the water, and are made to enclose vast shoals of fish. The trawl is dragged along the bottom by the fishing-boat; and the drift-net is like the seine, but is not loaded with lead; it is usually employed for mackerel fishing.

Various kinds of nets are used in bird-catching, one of which is noticed in the article CLAP-NET. Nets are used in catching quadrupeds, chiefly for the purpose of enclosing spaces within which they are, but sometimes also for throwing upon them to confuse and entangle them.

Nets are used by gardeners to protect crops from birds; also to protect the blossoms of trees from frost, and it is wonderful how well this object is accomplished, even when the meshes are pretty wide, and the sun's rays have very free access.

**NETTING, Naval.** A *boarding-netting* is formed of strong rope, and stretched above the bulwarks of a ship, over the port-holes, &c., to a considerable height, for the purpose of preventing the entrance of boarders from hostile boats. In positions where boat attacks are feasible, ships are thus protected at night, and at other times when attempts at boarding are anticipated.

The *hammock-netting* is in the bulwarks of a ship, usually in the waist, and its purpose is to keep the hammocks of the crew when stowed there during the day; thus netted together, the hammocks form a valuable barrier against bullets.

*Hatchway-nettings* are of such rope, and are placed over the open hatchways during fine weather, to prevent persons from falling through.

**NETTLE (*Urtica*)**, a genus of plants of the natural order *Urticæ*, having unisexual flowers, the male and female on the same or separate plants; the male flowers with a 4-parted perianth, and four stamens; the female flowers with a 2-parted perianth and a tufted stigma; the fruit an acheneum. The species are herbaceous plants, shrubs, or even trees, many of them covered with stinging hairs, which pierce the skin when touched, and emit an acrid juice, often causing much inflammation and pain. When a N. is grasped in such a way as to press the hairs to the stem, no stinging ensues; but the slightest inadvertent touch of some of the species produces very severe pain. The stinging of the native nettles of Europe is trifling in comparison with that of some East Indian species. *U. crenulata* is particularly notable for the severity of the pain which it produces, without either pustules or apparent inflammation. The first sensation is merely a slight tingling, but within an hour violent pain is felt, as if a red-hot iron were continually applied, and the pain extends far from the original spot, continues for about twenty-four hours and then abates, but is ready to return in its original intensity on the application of cold water, and does not cease for fully eight days. Cold water has a similar effect in increasing or renewing the pain of all kinds of nettles. Still more formidable than this species is *U. urentissima*, the *Devil's Leaf* of Timor. Of British species, the most venomous, but the most rare, is the **ROMAN N.** (*U. pilulifera*); next to it is the **SMALL N.** (*U. urens*), frequent about towns and villages, and in waste and cultivated ground; whilst the least venomous is the most common and only perennial species, the **GREAT N.** (*U. dioica*), everywhere abundant, but particularly near human habitations, or their former sites, the desolation of which it may be said to proclaim. The roots of nettles, boiled with alum, afford a yellow dye; and the juice of the stalks and leaves has been used to dye woollen stuffs of a beautiful and permanent green. The young shoots of *U. dioica* are used in some parts of Scotland and other countries as greens, and their peculiar flavor is much relished by some, although, in general, the use of them is confined to the poor; which, however, is probably the result of mere prejudice. Whatever it is that gives nettles their stinging power, is dissipated by boiling. The high value of nettles as food for swine is well known to the peasantry of many countries; the Great N. is cultivated in Sweden for fodder of domestic animals; nettles are also highly esteemed as food for poultry, particularly for turkeys. The seeds are externally nutritious to poultry; and are given to horses by jockeys, in order to make them lively when they are to be offered for sale. The stalks and leaves of nettles are employed in some parts of England, for the manufacture of a light kind of beer, called *N. beer*, which may be seen advertised at stalls, and in humble shops in Manchester and other towns. The best fibre of nettles is useful for textile purposes. Yarn and cloth, both of the coarsest and finest descriptions, can be made of it. The fibre of *U. dioica* was used by

Nettle-Rash  
Nachtstetel

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the ancient Egyptians, and is still used in Piedmont and other countries. When wanted for fibre, the plant is cut in the middle of summer, and treated like hemp. The names *N. Yarn* and *N. Cloth* are, however, now commonly given in most parts of Europe to particular linen and cotton fabrics.—The fibre of *U. cannabina*, a native of the south of Siberia and other middle parts of Asia, is much used; and from that of *U. Whitlavi*, both fine lace and strong ropes can be manufactured. The fibre of *U. Japonica* is much used in Japan, and that of *U. argentea* in the South Sea Islands; that of *U. Canadensis* is used in Canada.—The seeds and herbage of *U. membranacea* are used in Egypt as emmenagogue and aphrodisiac; and somewhat similar properties are ascribed to *U. dioica*.—*U. tuberosa* produces tubers, which are nutritious, and are eaten in India, raw, boiled, or roasted.—Australia produces a magnificent tree-nettle, *U. gigas*, abundant in some parts of New South Wales, ordinarily from 25 to 60 feet high, but sometimes 120 or 140 feet, with trunk of great thickness, and very large green leaves, which, when young, sting violently. In some places, it forms scrub forests, and its stinging leaves form a great impediment to the traveller.

NETTLE-RASH, or *Urtica'ria* (Lat. *urtica*, a nettle), is the term applied to a common form of eruption on the skin. The eruption consists of wheals, or little solid eminences of irregular outline, and either white or red, or most commonly both red and white, there being a white centre with a red margin. The rash is accompanied with great heat, itching, and irritation; the appearance on the skin and the sensation being very much like the appearance and feeling produced by the stinging of nettles; and hence the origin of its names.

The disease may be either acute or chronic. In the acute form, feverishness usually preceded the rash by a few hours, although sometimes they commence together. The disorder is always connected with some derangement of the digestive organs, and it may often be traced to the imperfect digestion of special articles of food, such as oatmeal, the kernels of fruit, strawberries, cucumbers, mushrooms, and especially oysters, mussels and crabs, which are eaten with perfect impunity by most persons. An hour or two after the offending substance has been swallowed, there is a feeling of nausea, with oppression about the pit of the stomach; the patient often complains of giddiness, and the face frequently swells; the skin then begins to tingle, and the eruption breaks forth; vomiting and diarrhoea often supervene, and act as a natural cure; but even when they do not occur, the violence of the rash usually subsides in a few hours, and the disorder altogether disappears in a day or two.

The chronic form is often very troublesome, and frequently comes on periodically in the evening. Cases are reported in which persons have been afflicted for ten years continuously by this form of the disease. Patients have left off all their customary articles of diet, one by one, without in all cases meeting with relief; and hence it may be inferred, that although the disease depends in all cases on a disordered condition of the digestive organs, it is not always the consequence of some special offending article having been swallowed.

The main treatment of the acute form consists in expelling the offending matter by an emetic and by purgatives, and the cure is thus usually completed. In the chronic form, the patient should, in the first place, determine whether the rash is caused by any particular article of diet, and if this seems not to be the case, an attempt must be made to improve the state of the digestive organs. A few grains of rhubarb taken daily, just before breakfast and before dinner, will sometimes effect a cure. If this simple remedy fails, Dr Watson recommends the trial of a draught composed of the infusion of serpentaria (about an ounce and a half), with a scruple each of the carbonate of magnesia and soda. He adds, that although external applications are usually of little avail, he has found that dusting the itching surface with flour sometimes affords temporary relief; and that a still more useful application is a lotion composed of a drachm of the carbonate of ammonia, a drachm of the acetate of lead, half an ounce of laudanum, and eight ounces of rose-water.

NETTLE-TREE (*Celtis*), a genus of deciduous trees of the natural order *Ulmaceæ*, with simple and generally serrated leaves, considerably resembling those of the Common Nettle, but not stinging. The genus is distinguished chiefly by its fruit, which is a fleshy, globose, or sub-globose 1-celled drupe. The Common or European *N. T.* (*C. Australis*) is a native of the south of Europe, the west of Asia, and the north of

**Africa.** It grows to the height of 30—40 feet, and is a very handsome tree, often planted along public walks in the south of France and north of Italy. The wood is very compact, very durable, and takes a high polish. It was formerly much imported into Britain for the use of coachmakers. It is used in Italy by musical-instrument makers for flutes and pipes. The flowers are inconspicuous, axillary, and solitary; the fruit black, resembling a small wild cherry, not eatable till after the first frosts, and then very sweet. The kernel yields a useful fixed oil. The tree succeeds well in the south of England.—*C. occidentalis*, is a native of North America from Canada to Carolina, sometimes there called the N. T., sometimes the SUGAR BERRY. Its leaves are much broader than those of *C. Australis*, its fruit very similar. It is a much larger tree, attaining a height of 60—80 feet.—Another American species, *C. crassifolia*, often called HACKBERRY or HAGBERRY, and HOOP ASH, is very abundant in the basin of the Ohio and westward of the Mississippi. It grows to a great height, but the trunk is not very thick. The wood is not much valued, but is said to make very fine charcoal. The fruit is black, and about the size of a pea.—The inner bark of *C. orientalis*, consisting of reticulated fibres, forms a kind of natural cloth, used by some tribes of India.—A number of other species are natives of the warm parts of America and of Asia.

**NEU-CHIWANG**, or Ying-Tze, a town of the Chinese Empire, in Manchuria. It stands on the left bank of the river Liaou, about 25 miles from its mouth, and in lat. 41° n., and long. 122° 30' e. The Liaou, which falls into the Gulf of Liaou-tong, at the head of the Yellow Sea, is navigable for sea-going vessels to N.; and N. is therefore regarded as a seaport, and is one of those opened to foreign trade by the treaty of Tientsin. A British consul resides here; but the trade is as yet considerable, and only to Chinese ports.

**NEU-BRANDENBURG**, a town of Mecklenburg-Strelitz, the prettiest and, after the capital, the largest in the duchy, is situated on Lake Tollens, 17 miles north-north-east of Neu-Strelitz. It is regularly built, contains two churches, a castle, &c., is the centre of a picturesque district, and the seat of considerable industry. Pop. (1871) 7245.—About half a league from N., on a rock overlooking Lake Tollens, stands the ducal pleasure-castle of Belvedere, commanding, it is said, the most beautiful prospect in Mecklenburg.

**NEUBURG**, an ancient town of Bavaria, is picturesquely situated on the right bank of the Danube, 29 miles north-north-east of Augsburg. It contains a handsome palace, the chateau of the Dukes of Bavaria of the line of Pfalz-Neunburg, who resided here from 1596 to 1749. The palace contains a collection of ancient armor. Brewing and distilling are carried on, and there is a considerable commercial trade on the Danube. Pop. (1871) 6390.

**NEUFCHATEL**, or Neuchatel, known also as *Neuenburg*, a canton in the west of Switzerland, between Lake Neufchatel and the French frontier, in lat. 46° 52'—47° 10' n., and long. 6° 28'—7° 5' e. Area, 304 sq. miles. Population, 97,284, at the close of 1870. N. lies in the midst of the Jura Mountains, four chains of which, running from north-east to south-west, traverse the canton, and are separated by elevated longitudinal valleys. The most easterly of these is a broken chain, running parallel to the lake of Neufchatel, on whose banks, and on the second and lower ranges beyond it, the vine is carefully cultivated. This second chain has five principal passes, the highest of which, La Tourne, has an elevation of about 4000 feet. The third and fourth ranges, abutting on France, consist for the most part of barren hills, separated by elevated valleys; but here and there these high lands are well wooded and fruitful, producing corn, good pasture, fruits, &c. The greater number of the numerous streams which water the canton flow into the Rhine. Among these mountain torrents, the principal are the Reuse, the Seyon, and the Serriere, the two former of which, together with the rivers Orbe and Broie, are the feeders of the Lake of Neufchatel, known also as the Lake of Yverdun. The Thiele serves as its outlet, and carries its waters into the neighboring lake of Bienné, and into the river Aar. The lake is 25 miles long, and from 8 to 5½ miles wide. Its level above the sea is 1420 feet, and it has a depth of 400 or 500 feet.

The natural products are iron ores, coal, asphalt, fruit, including grapes—from which good red and white wines are made—timber and corn, although the latter is not grown in sufficient quantity for the demands of the home consumption. The



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rearing of cattle constitutes an important branch of industry, and large quantities of cheese are exported; but the specialty of the canton is watch-making, which occupies from 19,000 to 20,000 persons, and is prosecuted in detail at the homes of the work-people in the rural districts, where some families manufacture only special parts of the machinery, while others are engaged solely in putting together the separate portions that have been manufactured by others; and the watches thus prepared are exported in large quantities to every part of Europe and America. Muslin printing employs upwards of 10,000 persons, and lace is extensively made by the country-women of the Val de Travers.

The climate of N. varies greatly with the locality, being temperate on the shores of the lake, cooler in the valleys, and severe on the mountain-sides. The population, with the exception of between 9000 and 10,000 Catholics, belongs to various Protestant denominations.

The history of N. was identical with that of Burgundy till the 11th c.; and after the principality had been for a time incorporated with the territories of the Counts of Chalons, to whom it had been granted in 1283 by Rudolph of Hapsburg, it passed to the House of Longueville. In 1707, on the extinction of the N. branch of the latter family, 15 claimants came forward to advance more or less valid pretensions to the N. territory. Frederick I. of Prussia, who based his claim to the principality of N. on the ground of his descent from the first Prince of Orange, a descendant of the House of Chalons, was the successful candidate; and from his time it continued associated with Prussia till 1806, when Napoleon bestowed it upon General Berthier; but in 1814, it was restored to the House of Brandenburg. This connection with the Prussian monarchy has been wholly dissolved since 1857, and N. is now a member of the Swiss Confederation.

NEUFCHATEL, or Nen'enburg, is the chief town of the canton, and occupies a magnificent site on the north-west shore of the Lake of Neufchatel, and is noted for its many charitable institutions, and for the beauty of its charmingly situated environs. Pop. (1870) 13,321.

NEUHHAUS, a town of Bohemia, on the Neescharka, about 70 miles south-south-east of Prague. Its palace, belonging to Count Czerny, is a splendid edifice. Cloth-paper, and chemical products are manufactured. Pop. (1869) 8620.

NEUHÄUSEL (Hung. *Brack-Ujvár*), a town of Hungary, on the right bank of the Neutra, 74 miles north-west of Pesth, by the Vienna and Pesth Railway. It was formerly strongly fortified, and played an important part in the Turkish wars. No traces of its fortifications now remain. Pop. (1869) 9483, chiefly engaged in agriculture and the rearing of cattle.

NEUILLY (sometimes called NEUILLY-SUR-SEINE, to distinguish it from several much less important places of the same name), a town of France, in the dep. of Seine, on the right bank of the river Seine, immediately to the north of the Bois de Boulogne. N. may now be regarded as a suburb of Paris, with which it is connected by several streets, or roads, lined with numerous villas. Here, near the Seine, and in a large and beautiful park, formerly stood the Château de Neuilly, built by Louis XV., and the favorite residence of Louis Philippe, which was burned at the revolution in 1843. The park was also then divided into lots for sale, the consequence being a rapid increase of the number of houses in Neuilly. N. has manufactures of porcelain and starch, chemical works and distilleries. Pop. (1872) 25,466. When Louis Philippe abdicated, and took refuge in England, he assumed the title of Count de Neuilly.

NEUMÜNSTER, a prosperous manufacturing and market town of Holstein, on the Schwale, one of the head-waters of the Stoor, and on the railway between Altona and Kiel, 19 miles south-by-west from Kiel. There are large woollen and linen factories, tanneries, dye-works, and breweries. Pop. (1875) 10,124.

NEURALGIA (Gr. *neuron*, a nerve; *algos*, pain) is a term employed to designate pain of a purely nervous character, usually unaccompanied by inflammation, fever, or any appreciable change of structure. The pain, which occurs in paroxysms, usually followed by complete remissions, is of every possible degree and character, being described in different cases as piercing, tearing, burning, &c. These paroxysms may occur at intervals of a few seconds only, or they may take place daily

or on alternate days, or they may be separated by much longer intervals, which are often, but by no means always, of a regular length. With the pain, there is frequently spasmodic twitching of the adjacent muscles. The duration of the disease is very uncertain. The patient may have only a single attack, or he may be liable to recurring attacks for months, years, or even for his whole life; it is, however, very seldom that the disease occurs but once. Death scarcely ever results directly from this affection, but the pain may, by its severity and persistence, gradually undermine the constitution.

The disease may attack any part of the body where there are nerves; but in no part does it occur so frequently as in the face, when it is popularly known as *Tic Douloureux*; its seat being in the facial branches of the fifth pair of nerves (the trifacial nerves). The following graphic description of the ordinary varieties of this form of neuralgia is borrowed from Dr Watson's "Lectures on the Principles and Practice of Physic:" "When the uppermost branch of the trifacial nerve is the seat of the complaint, the pain generally shoots from the spot where the nerve issues through the superciliary hole; and it involves the parts adjacent, upon which the fibrils of the nerve are distributed—the forehead, the brow, the upper lid, sometimes the eyeball itself. The eye is usually closed during the paroxysm, and the skin of the forehead on that side corrugated. The neighboring arteries throb, and a copious gush of tears take place. In some instances, the eye becomes blood-shot at each attack; and when the attacks are frequently repeated, this injection of the conjunctiva may become permanent.

"When the pain depends upon a morbid condition or morbid action of the middle branch of the nerve, it is sometimes quite sudden in its accession, and sometimes comes on rather more gradually; being preceded by a tickling or pricking sensation of the cheek, and by twitches of the lower eyelid. These symptoms are shortly followed by pain at the infra-orbital foramen, spreading in severe flashes (so to speak) over the cheek, affecting the lower eyelid, ala nasi, and upper lip, and often terminating abruptly at the mesial line of the face. Sometimes it extends to the teeth, the nostrils, the hard and soft palate, and even to the base of the tongue, and induces spasmodic contractions of the neighboring muscles.

"When the pain is referrible to the inferior or maxillary branch of the fifth pair of nerves, it darts from the mental foramen, radiating to the lips, the alveolar processes, the teeth, the chin, and to the side of the tongue. It often stops exactly at the symphysis of the chin. Frequently it extends in the other direction, to the whole cheek and to the ear. During the paroxysm, the features are liable to be distorted by spasmodic action of the muscles of the jaw, amounting sometimes to tetanic rigidity, and holding the jaw fixed and immovable.

"The paroxysms of suffering in this frightful disease are apt to be brought on by apparently trivial causes—by a slight touch, by a current of air blowing upon the face, by a sudden jar or shake of the bed on which the patient is lying, by a knock at the door, or even by directing the patient's attention to his malady, by speaking of it or asking him questions about it. The necessary movements of the face in speaking or eating are often sufficient to provoke or renew the paroxysm. At the same time, firm pressure made upon the painful part frequently gives relief, and causes a sense of numbness to take the place of the previous agony" (vol. i. pp. 723, 724).

*Tic douloureux* is the form of severe neuralgia which is by far the most commonly met with; the reason probably being, that the trifacial nerve, lying superficially, and being distributed over a part of the surface which is usually unprotected by any artificial covering, is very liable, for that reason, to be affected by exposure to atmospheric influences, which are undoubtedly to be included among the exciting causes of this disease. Amongst other seats of neuralgia may be mentioned the arm, especially the forearm, the spaces between the ribs, especially between the sixth and ninth, and the lower extremity, where it most frequently affects the sciatic nerve, giving rise to the affection known as *SCIATICA*, which, however, not always being pure neuralgia, will be noticed in a separate article.

The causes of neuralgia are various. Excluding inflammation of the nervous trunk or *neuritis*, the pain may be excited by a tumor pressing on the nerve, or originating in its substance; or by roughness of a bony surface with which the nerve may be in contact, as when it passes through a foramen; or it may be due to tumors

within the cranium, or a morbid state of the spinal cord. Sometimes, again, irritation applied to *one* branch of a nerve will give rise to pain at the extremity of *another* branch of the same nerve, the sensation being reflected along the branch which is not directly exposed to the irritation. In this way we may explain the pain in the shoulder which often accompanies disease of the liver; the pain in the thigh, which is often associated with irritation of the kidney; the pain in the left arm, which is often coincident with disease of the heart, &c. Persons suffering from debility, anæmia, and a gouty or rheumatic constitution, are so especially liable to neuralgia, that these conditions—as also exposure to malarious influences—must be paid among the predisposing causes. Amongst the exciting causes, exposure to cold and wet, or to a cold dry east wind, is the most frequent; but fatigue, strong mental emotions, the abuse of tea, coffee, tobacco, and alcoholic drinks, a wound or bruise, the retrocession of gout, rheumatism, or cutaneous eruptions, &c., occasionally suffice to excite the disease.

The resources of the materia medica have been exhausted in searching for remedies for this cruel disease. Dr Eliotson believes that “in all cases of neuralgia, whether exquisite or not, unaccompanied by inflammation, or evident existing cause, iron is the best remedy;” and there can be no doubt that when the disease is accompanied with debility and paleness, no remedy is likely to be so serviceable. If the digestive organs are out of order, the neuralgia may not unfrequently be removed or alleviated by correcting their unhealthy state. “Dr Rigby tells us that having suffered in his own person an intense attack of tic douloureux, which opium did not assuage, he swallowed some carbonate of soda dissolved in water. The effect was almost immediate; carbonic acid was eructed, and the pain quickly abated. In this case, the pain depended upon the mere presence of acid in the stomach. More often the cause of offence appears to lie in some part of the intestines; and purgatives do good. Sir Charles Bell achieved the cure of a patient upon whom much previous treatment had been expended in vain, by some pills composed of cathartic extract, croton oil, and galbanum. He mixed one or two drops of the croton oil with a drachm of the compound extract of colocynth; and gave five grains of this mass, with ten grains of the compound galbanum pill, at bedtime. Other cases have been since reported, both by Sir Charles and by others in which the same prescription was followed by the same success.”—Watson, *op. cit.* p. 727.

When the disease occurs in a rheumatic person, iodide of potassium (from three to five grains taken in solution three times a day before meals) sometimes gives great relief. When the paroxysms occur periodically—as, for example, with an interval of 24 or 48 hours—sulphate of quinine in doses of from 10 to 20 grains between the paroxysms, will usually effect a cure; and if the disease resist comparatively small doses, the quantity may be increased to half a drachm, or a drachm if necessary. Arsenic acts in the same manner as quinine in these cases, but less effectually.

The inhalation of chloroform will sometimes give permanent relief, and always gives temporary ease, and shortens the period of suffering.

The injection of a certain quantity of a solution of muriate of morphia, by means of a sharp-pointed syringe, into the cellular tissue beneath the skin over the painful spot, very often gives immediate relief. For the discovery of this mode of treating neuralgia, we are indebted to Dr Alexander Wood of Edinburgh. At one time—about half a century ago—it was a common practice to divide the trunk of the painful nerve, with the object of cutting off the communication between the painful spot and the brain; but in many instances the operation signally failed, and it is now never resorted to. A much simpler operation, namely, the extraction of a canine tooth, has often been found to give permanent relief in cases of facial neuralgia, and in such case a careful examination of the teeth should usually be made.

Local applications can be of no permanent service in cases where the pain results from organic change, or from general constitutional causes; they will, however, often give considerable temporary relief. Amongst the most important local applications may be mentioned laudanum, tincture of aconite (or aconitina ointment, in the proportion of one or two grains to a drachm of simple ointment or cerate), belladonna-plaster, and chloroform (which should be applied upon a piece of linen saturated with it, and covered with oiled silk, to prevent evaporation).

Lastly, neuralgia being a purely nervous affection, is often influenced by means

calculated to make a strong impression on the mind of the patient; and hence it is that galvanic rings, electric chains, mesmeric passes, homœopathic globules, and other applications, which, like these, act more upon the mind than upon the body of the patient, occasionally effect a cure.

**NEURITIS** is the term applied to inflammation of the nerves. The disease is rare, and not very well defined. The symptoms closely resemble those of neuralgia. Rheumatism seems, in most cases, to be the cause of the disease, which must be treated by bleeding, leeching, purging, and low diet. Anodynes are also required for the relief of the pain; and of these, Dover's Powder, in tolerably full doses, is perhaps the best.

**NEUROPTERA** (Gr. nerve-winged), an order of mandibulate insects, having four nearly equal and membranous wings, all adapted for flight, divided by their nervures into a delicate net-work of little spaces, and not covered with fine scales, as in the *Lepidoptera*. The wings are often extended horizontally when at rest, nearly as in flight; but the position is various. The form of the wing is generally somewhat elongated. The body is generally much elongated, particularly the abdomen. The head is often large, the compound eyes very large, and there are often also simple or stemmatic eyes. The habits are predaceous, at least in the larva state; often also in the pupa and perfect states, the food consisting of other insects, often caught on the wing. The power of flight is accordingly great in many. The larvae and pupæ are often aquatic. The females have no sting, and only a few have an ovipositor. The metamorphosis is complete in some, incomplete in others. Dragon-flies, May-flies, scorpion-flies, ant-lions, and termites, or white ants, belong to this order.

**NEUSATZ** (also *Neopanta* or *Uj-Videk*), a town of the Austrian empire, in the Hungarian province of Bács, is situated on the left bank of the Danube, opposite Peterwardein. Its origin dates from the year 1700, and by the year 1849 it numbered nearly 30,000 inhabitants. A bridge, 840 feet in length, extends between N. and the town and fortress of Peterwardein. N. is the seat of the Greek non-united Bishop of Bács. On the 11th June 1849, it was taken from the Hungarian insurgents by the imperial troops, and was almost wholly destroyed. It has been rebuilt in excellent style. N. is a station for steamers on the Danube, and carries on an important and active trade. Pop. (1869) 19,119.

**NEUSE**, a river of North Carolina, United States of America, rises near the middle of the northern boundary of the state, and, after a south-easterly course of 360 miles, falls by a broad channel into Pamlico Sound, which communicates by several inlets with the Atlantic Ocean. It forms the harbor of Newbern.

**NEUSIEDL**, Lake (Hung. *Ferto-tava*), a small lake on the north-west frontier of Hungary, 23 miles south-east of Vienna. It is 23 miles in length, and about 6 miles in average breadth, with a mean depth of 13 feet. Its waters are light-green in appearance, and are brackish in taste. The slopes of the Leitha Mountains in the vicinity produce excellent wine.

**NEUSOHL** (Hung. *Besztercze-Bánya*), a beautiful and thriving town of Hungary, the chief place of the richest mining district in the country, is situated in a hill-enclosed valley on the right bank of the Gran, about 85 miles north of Pesth. N., consisting, as it does, of the town proper and five suburbs, contains a population, in all, of (1869) 11,780, who are employed in the copper and iron mines of the vicinity, in the smelting houses, and in the manufacture of beet-root sugar, paper, colors, &c. It is the seat of a bishop, and contains a beautiful cathedral, a bishop's palace, and two evangelical churches, and several other handsome edifices.

**NEUSS**, a fortress and flourishing manufacturing town of Rhenish Prussia, near the left bank of the Rhine, with which it is connected by the river Erft, 4 miles south-west of Düsseldorf. Its church of St Quirinus, a beautiful edifice, and a notable specimen of the transition from the round to the pointed style, is supposed to have been built in 1209. N. is the principal grain-market of the province, and carries on manufactures of woollen and other cloths, ribbons, hats, vinegar, &c. It is supposed to be the *Nobesium* of the Romans, sacked by Attila in the year 451. Pop. (1876) 16,562.

Neustadt  
Neutrals

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NEUSTADT (Polish, *Prudnitz*), a town of Prussian Silesia, 29 miles south-west of Oppeln. It is the seat of considerable manufacturing industry, woollen and linen fabrics being the staple goods manufactured. Damask-weaving alone employs 660 hands, and 390 looms. Pop. (1875) 12,515.

NEUSTADT, or Wiener-Neustadt, one of the most beautiful towns of Lower Austria, called, from its loyalty, "the ever-faithful town" (*ewig getreue Stadt*), is situated 28 miles south of Vienna, on the Vienna and Gloggnitz Railway, and is also connected with the capital by a canal. It is surrounded by a broad and deep ditch, and by a fortified wall pierced by four gates. The town is overlooked by the large old castle of the Dukes of Babenberg, now a military academy for the preparatory instruction of officers of the line. It accommodates from 400 to 500 pupils. The castle contains a fine Gothic chapel (date, 1460), rich in painted windows. It is the burial-place of the Emperor Maximilian I. On the 14th September 1834, the whole town, with the exception of fourteen houses, was destroyed by a dreadful conflagration, which involved the loss of many lives. The new town has been laid out with great taste and regularity. The canal (40 miles in length) and the railway to Vienna, and the converging roads from Styria and Hungary, are the sources of the prosperity of the town. In N. machinery is extensively constructed; and sugar-refining and manufactures of silk, velvet, and cotton fabrics, fayence, leather, &c., are carried on. Pop. (1869) 18,070.

NEUSTADT AN DER HARDT, a small town of Rhenish Bavaria, charmingly situated on the Speyerbach, at the foot of the Hardt Mountains, 13 miles north of Landau. Its church, with several curious monuments of the Counts Palatine, and with some ancient fresco-paintings, was finished in the 14th century. It carries on manufactures of paper, cloth, oil, brandy, &c. Pop. (1875) 10,224.

NEUSTADT-E'BERSWALDE (since 1876 called officially *Eberswalde* only), a town of Prussia, in the province of Brandenburg, 28 miles north-east of Berlin. It is well known on account of its mineral springs, and carries on extensive manufactures in steel, iron, copper, brass, paper, and porcelain. Pop. (1875) 40,069.

NEUSTADTL AN DER WAAG, a town near the north west frontier of Hungary, 23 miles north-north-west of Neutra. Here excellent red wine is grown, and there is a good trade in grain, wool, sheep-skins, and wax. Pop. (1869) 5451, nearly half of whom are Jews.

NEUSTETTIN, a town of Prussia, in the province of Pomerania, 92 miles south-west from Danzig, on the southern shore of the Vilm Sec. It is the capital of a circle, and a place of some importance. Pop. (1875) 6971.

NEU-STRE'LITZ, the capital and the residence of the court of the grand duchy of Mecklenburg-Strelitz, pleasantly situated in a hilly district, between two lakes, 60 miles north-north-west of Berlin. It was founded in 1733, is built in the form of an eight-rayed star, and contains the ducal palace, with a library of 70,000 vols., and having magnificent gardens attached. Pop. (1875) 8525, supported chiefly from the expenditure of the court, and by brewing and distilling. A mile south of the town is Alt-Strelitz, with the largest horse-market in the duchy.

NEUSTRIA, or West France (*Francia Occidentalis*), the name given in the times of the Merovingians and Carlovingians to the western portion of the Frank empire, after the quadruple division of it which took place in 511. N. contained three of these divisions. It extended originally from the mouth of the Scheldt to the Loire, and was bounded by Aquitania on the s., and by Burgundy and Austrasia (*Francia Orientalis*) on the e. The principal cities were Soissons, Paris, Orleans, and Tours. Bretagne was always loosely attached to Neustria, of which the strength lay in the Duchy of France. After the cession of the territory afterwards called Normandy to the Normans in 912, the name Neustria soon fell into disuse.

NEU'TITSCHKEIN, a small manufacturing town of Moravia, on the Titch, 80 miles north-east of Brünn. It contains an old castle, and carries on manufactures of cloth and woollen goods, dyeing, and wagon-making. Pop. (1869) 5645.

NEUTRA, a town of Hungary, the capital of a county of the same name, on a river of the same name, 72 miles north-north-west from Pesth. N. is a very old town, having been the residence of a Moravian prince in the 9th c., before the

Magyar invasion. Weaving is carried on to some extent, and N. being not far from the Moravian frontier, has a considerable transit-trade. Pop. (1869) 10,638.

**NEUTRAL AXIS**, the name given to an imaginary line through any body which is being subjected to a transverse strain; and separating the forces of extension from those of compression. If the ratio of resistances to extension and impression were the same for all substances, and depended merely on the form of the body, then in all bodies of the same form the neutral axis would have a definite geometrical position; but it has been satisfactorily proved, by Mr Eaton Hodgkinson, that this ratio has a separate value for each substance. In wood, where the ratio is one of equality, the neutral axis in a beam supported at both ends, whose section is rectangular, passes lengthwise through the centre of the beam; while in cast-iron, in which the resistance to compression is greater than that to extension, it is a little above, and in wrought iron, in which the contrary is the case, it is a little below, the centre.

**NEUTRAL SALTS.** See **SALTS**.

**NEUTRALS**, nations who, when a war is being carried on, take no part in the contest, and evince no particular friendship for, or hostility to, any of the belligerents. As a general rule, neutrals should conduct themselves with perfect impartiality, and do nothing which can be considered as favoring one belligerent more than another.

The duties and obligations of neutrals at sea have given rise to many complicated questions. It is allowed on all hands that a neutral state forfeits her character of neutrality by furnishing to either belligerent any of the articles that come under the denomination of Contraband of War (q. v). If she does so, the other belligerent is warranted in intercepting the succors, and confiscating them as lawful prize. Contraband of war, besides warlike stores, has sometimes been held to include various other articles, a supply of which is necessary for the prosecution of the war; and it has been doubted how far, in some circumstances, corn, hay, and coal may not come under that category.

An important question regarding the rights of neutrals is, whether enemies' goods not contraband of war may be lawfully conveyed in neutral bottoms. The principle that free ships make free goods, was long resisted by this and other maritime countries, and the general understanding has been, that belligerents have a right of visiting and searching neutral vessels for the purpose of ascertaining—1st, whether the ship is really neutral, as the hoisting of a neutral flag affords no absolute security that it is so; 2d, whether it has contraband of war or enemies' property on board. Neutral ships have therefore been held bound to provide themselves with passports from their government, and such papers as are necessary to prove the property of the ship and cargo, and it is their duty to heave to when summoned by the cruisers of either belligerent. It has been considered that a neutral ship which seeks to avoid search by crowding sail or by open force, may be captured and confiscated. When a merchant-ship is sailing under convoy of a vessel of war, it has been said that the declaration of the officer in command of the convoy that there is no contraband of war or belligerent property on board, is sufficient to bar the exercise of the right of search.

A declaration having important bearings on the rights of neutrals, was adopted by the plenipotentiaries of Great Britain, Austria, France, Prussia, Russia, Sardinia, and Turkey, assembled in congress at Paris, on April 16, 1856. By its provisions, 1. Privateering is abolished. 2. A neutral flag covers enemies' goods, with the exception of contraband of war. 3. Neutral goods, with the exception of contraband of war, are not liable to capture under the enemy's flag. 4. Blockades, in order to be binding, must be effective, that is, maintained by a force sufficient really to prevent access to the coast of the enemy.

It has sometimes been proposed to exempt private property at sea from attack during war—such a project, however, seems inexpedient. There may be a propriety in respecting the property of individuals on land, in a time of war, because its destruction, however injurious to the persons immediately concerned, can have little influence on the decision of the contest. But at sea, private property is destroyed because those from whom it is taken, being purveyors or carriers for the community at large, its loss must seriously affect the public, and have no small influence in bringing the contest to an end. See **BLOCKADE**, **PRIVATEER**.

Newwied  
New Brunswick

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**NEU'WIED**, a town of Rhenish Prussia, on the right bank of the Rhine, 8 miles below Coblenz. It is the capital of the principality of Wied, now mediatised and attached to Prussia, and is the seat of the princes of Wied, with a beautiful castle. It was founded in the beginning of the 18th c. by Prince Alexander of Wied-Newwied, who, offering perfect toleration in religious matters, as an inducement, invited colonists of whatever persuasion to settle here. The town is well built, with wide, straight streets, running at right angles to each other, and contains the churches of Protestants, Catholics, Jews, Herrnhuters, &c. The inhabitants are well conditioned and industrious. Pop. (1871) 8664, who carry on manufactures of hosiery, woolen and cotton fabrics, iron-ware, leather, and tobacco.

**NE'VA**, a river of Russia, in the government of St Petersburg, flows westward from the south-west corner of Lake Ladoga to the Bay of Cronstadt, in the Gulf of Finland. Its length, including windings, is about 40 miles, 9 miles of which are within the limits of the city of St Petersburg; and in some places it is 2100 feet broad, and about 56 feet deep; although at Schlusseiburg, where it issues from the lake, and at St Petersburg, where it enters the sea by several branches, it is shallow. From Cronstadt, goods are brought to St Petersburg in lighters or in small steamers. By the Ladoga Canal, the N. communicates with the vast water-system of the Volga, and thus it may be said to join the Baltic with the Caspian Sea. Its current is very rapid, and the volume of its waters is immense. It is covered by drift-ice for upwards of five months—from about the 25th November to the 27th April. An extensive traffic is carried on on its waters, both from the interior and from the Baltic.

**NEVA'DA**, one of the states of North America, is bound on the w. by California; on the s. by California and Arizona; on the e. by Utah and Arizona; and on the n. by Oregon and Idaho. Lat. 35°—42° n.; long. 114°—120° w. Area, 104,125 square miles. The population in 1880 was 62,366 (including 5,419 Chinese), besides 4,000 tribal Indians. The chief river is the Humboldt. The principal lakes are the Mud Lakes, Pyramid Lakes, and the Walker and Carson Lakes. N. is the centre of that elevated basin which reaches westward from the Rocky Mountains to the Sierra Nevada, at a mean altitude of about 4000 feet above the level of the sea. Numerous mines, of either gold or silver, have been discovered. The whole country is rich in mineral wealth. Besides gold and silver, quicksilver, lead, and antimony are found. The territorial capital is Carson City (pop. 4229), but the principal town is Virginia City (pop. 10,917). The product of silver in N. during the decade 1859—1869 was valued at 137,382,000 dollars; in 1874 its value was about 25,500,000 dollars.

**NEVERS**, a town of France, capital of the department of Nièvre, and formerly the capital of the province of Nivernais, is built on a hill in the midst of fertile plains, at the confluence of the Loire and the Nièvre, 140 miles south-south-east of Paris. Highly picturesque, as seen from a distance, its interior shews steep, winding, and badly paved streets. It contains a beautiful cathedral of the 10th c., and a fine public garden; the large cavalry barrack, the fine bridge of 20 arches over the Loire, and the triumphal arch, erected in 1746, to commemorate the battle of Fontenoy, are also worthy of mention. N. is the see of a bishop, contains a public library, and has numerous educational, scientific, and benevolent institutions, and an arsenal. There is here an important canon-foundry, and the principal manufactures are porcelain and earthenware, glass, brandy, iron cables and chains, and awls. Pop. (1872) 19,314.

**N.**, the *Noviodunum* of the Romans, existed prior to the invasion of Gaul by Julius Cæsar. It has been the seat of a bishop since the beginning of the 6th c., when it was called Nevirum, became a county in the 10th c., and was erected into a duchy by Francis I. in 1538.

**NEVIA'NSK**, a town of Russia, in the government of Perm, 50 miles north from Ekaterinburg. It is on the eastern or Siberian side of the Ural Mountains, and stands on the Neiva, the waters of which flow by the Tobol and the Irtysh to the Obi. The district around N. is famous for its mineral wealth, particularly for its productiveness of gold, copper, and platinum. N. has a mint, the tower of which is remarkable as leaning even more than the celebrated tower of Pisa. Pop. 13,000.

**NE'VILLE'S CROSS**. See BRUCE, DAVID.

**NE'VIS**, a small island of the West Indies, belonging to Great Britain, forms one

of the group of the Lesser Antilles, and lies immediately south-east of St Christopher's, from which it is separated by a strait called the *Narrows*, two miles wide. It is circular in form, rises in a central peak to the height of about 2500 feet, and has an area of 20 square miles. Pop. (1871) 11,735, of whom very few are white. Charlestown, a seaport, with a tolerable roadstead, situated on the south-west shore of the island, is the seat of government, consisting of a government council and general assembly. The soil is fertile, and the principal products are sugar, molasses, and rum. In 1875 the revenue of N. was £10,001; and the expenditure, £9526. The imports for 1873 were valued at £52,293; and the exports at £53,225. The value of the sugar exported was £72,342, more than double the value of the year before, but only about £6000 more than in 1871. The tonnage of vessels entering and clearing in 1873 amounted to 24,429.

**NEW A'LBANY**, a city in Indiana, U. S., on the north bank of the Ohio River at the foot of the falls, opposite Portland, and 2 miles below Louisville, Kentucky; a finely situated, well built town, having 23 miles of streets, 6 ship-yards, 6 foundries, 30 churches, and is the site of Asbury College and a collegiate institute. It has a large river-trade and railway connections with Indiana and Kentucky. Pop. (1870) 15,396; (1880) 16,422.

**NEW BE'DFORD**, a seaport city of Massachusetts, U. S., on Buzzard's Bay, 55 miles south of Boston. Since 1755, it has been the chief centre of the American whale fisheries. The value of this industry has been for many years on the decline. The trade was at its height in 1853—4, when there were in the district 410 whalers of 132,966 tons, which brought home 44,923 barrels of sperm oil, 118,672 barrels of whale oil, and 2,533,600 lbs. of whalebone. In 1873, N. B. possessed 128 whalers, which brought home 30,981 barrels of sperm oil, 25,729 barrels of whale oil, and 150,665 lbs. of whalebone. It has oil and candle factories, cotton mills, iron mills, copper and glass works, 30 churches, 6 banks, 2 daily and 2 weekly newspapers, a public library of 30,000 volumes, city-hall, custom-house and alms-house. Pop. (1870) 21,220; (1880) 26,845.

**NEW BRITAIN**, a manufacturing town in Connecticut, United States, 10 miles south of Hartford, engaged in the production of stockinet goods, locks, jewellery, hooks and eyes, and various kinds of hardware. It has six churches. The water supply is from a reservoir of 175 acres, with a head of 200 feet, supplying public fountains with jets of 140 feet, and dispensing with fire-engines. Pop. (1880) 13,979.

**NEW BRITAIN**, the name of one principal, and of several subsidiary islands in the Pacific Ocean. In lat. between 4°—6° 30' s., and long. between 148°—152° 30' e. The principal island, 300 miles in length, and having an area of 12,000 square miles, lies east of Gew Guluen, from which it is separated by Dampier's Straits. The surface is mountainous in the interior, with active volcanoes in the north, but along the coast are fertile plains. Forests abound in the island, and palms, sugar-cane, breadfruit, &c., are produced. The inhabitants, the number of whom is unknown, are described as a tribe of "oriental negroes," and are well formed, active, and of a very dark complexion. They are further advanced in civilisation than is usual among the Polynesians, have a formal religious worship, temples, and images of their deities. N. B. was first seen by Le Maire and Schouten in 1616, but Dampier, at a later date, was the first to land.

**NEW BRUNSWICK**, a city of New Jersey, U. S., is on the south bank of the Raritan River, at the head of navigation, 15 miles from its mouth, 30 miles south-west of New York, on the New Jersey Railway, and the Delaware and Raritan Canal. It has extensive manufactures of cotton, leather, India-rubber, paper-hangings, iron, and machinery, 17 churches, 2 banks, and 4 newspapers. It is the seat of Rutgers College and a theological seminary. Pop. (1860) 11,225; (1880) 17,166.

**NEW BRUNSWICK**, a province of the Dominion of Canada, in North America, is bounded on the n. w. by Canada and the Bay of Chaleur, on the n. e. by the Gulf of St Lawrence and the Strait of Northumberland, on the s. by Nova Scotia and the Bay of Fundy, and on the s. w. by the State of Maine. It has an area of 27,710 square miles, or 17,784,400 acres (rather more than the area of Scotland), and a population, in 1871, of 285,594. The coast-line is 500 miles in extent, and is indented by spacious bays, inlets, and harbours, which afford safe and commodious



anchorage for shipping. The chief are Fundy, Chignecto, and Cumberland Bays, the last two being merely extensions of the first; Passamaquoddy Bay in the south; Verte, Shediac, Cocaigne, Richibucto, and Miramichi Bays on the north-east, and the Bay of Chaleur, 80 miles long by 27 broad, in the north-west. The province of N. B. abounds in rivers. The principal are the St John and the St Croix, the former 450, and the latter 100 miles in length, and both falling into the Bay of Fundy; and of the rivers that flow eastward into the Gulf of St Lawrence, the Richibucto, the Miramichi, and the Restigouche. The province contains numerous lakes, one of which, Grand Lake, is 100 square miles in area. Most of the others are much smaller. The surface is for the most part flat or undulating. With the exception of the district in the north-west bordering on Canada and the river Restigouche, no portion of N. B. is marked by any considerable elevation. Here, however, the country is beautifully diversified by hills of from 500 to 800 feet in height. These elevations, which form an extension of the Appalachian range, are interspersed with fertile valleys and table-lands, and are clothed almost to their summits with lofty forest-trees. In this district the scenery is remarkably beautiful. In the south of the colony the surface is broken up by great ravines, and the coast is bold and rocky. The shores on the east coast, and for twenty miles inland, are flat. The soil is deep and fertile. Of the whole acreage, 14,000,000 acres are set down as good land, and 3,600,000 acres as poor land. N. B. contains a rich and extensive wheat-producing district; but the inhabitants, dividing their time between farming, lumbering, fishing, ship-building, and other pursuits, and following no regular system of tillage, have not till quite recently attempted to keep pace with modern agricultural improvements. The farming has not been judicious; many parts of the country have been allowed to become exhausted; and, although signs of improvement begin to be manifest, still there is prevalent a deplorable lack of knowledge of the principles of scientific agriculture. Several cheese-factories have been established in the province within the last few years. In one year, one of these has manufactured as much as 25,000 lbs. The crown-lands are at present being disposed of under the Act 31 Vict. cap. 7, 1888. This act provides that certain portions of eligible land shall be reserved for actual settlers, and not be disposed of to speculators, or for lumbering purposes. A male of 18 years of age or upwards may obtain 100 acres, either by payment, in advance, of 20 dollars (about £4, 3s.), to aid in the construction of roads and bridges in the vicinity of his location; or upon his performing labor on such roads and bridges, to the value of 10 dollars a year, for three years. He must also, within two years, build a house on his land of not less dimensions than 16 feet by 20, and clear two acres. After a residence for three years in succession, he receives a deed of grant, if he has paid the 20 dollars in advance, or cultivated 10 acres. The receipts of the crown-lands department of the provincial government, for the year ending October 31, 1883, amounted in value to 3,308,100 dollars. During 1870, no less than 925 grants of land were issued. The climate is remarkably healthy, and the autumn—and especially the season called the Indian summer—is particularly agreeable. In the interior, the heat in summer rises to 90°, and sometimes to 95°; and in winter, which lasts from the middle of December to the middle of March, the mercury sometimes falls as low as 40° below zero. At Fredericton, the capital, situated on St John's River, 65 miles from the south, and 180 miles from the north coast, the temperature ranges from 35° below to 95° above zero, and the mean is about 42°.

The north-western portion of the province is occupied by the upper Silurian formation. Next are two belts of lower Silurian. Small patches of the Devonian, Huronian, and Laurentian systems are found on the Bay of Fundy. A large part of the province is occupied by carboniferous strata. The mineral coal is for the most part impure or in thin seams, and is hardly worked; but the so-called Albertite of Albert county is the most valuable deposit of bituminous matter on the American continent. It yields 100 gallons of crude oil per ton. Gold and silver occur in N. B.; copper and iron ore of excellent quality abound; gypsum, plumbago, and limestone are very abundant, and the freestone of the province, unsurpassed for beauty and durability, commands a high price in the States. Wild animals abound in the province; the lakes and rivers are well stocked with fish, and along the coasts, cod, haddocks, salmon and other fish are caught in great plenty. The number of schools in N. B. during the winter of 1869 was 828, in which 29,764 pupils were en-

rolled. The value of the imports for 1873-4 was 10,223,871 dollars; of exports, 6,504,304 dollars. The number of vessels entering the ports was 2784, of 175,638 tons; clearing, 2662, of 799,265 tons. The number of men employed in the fisheries was 6656; number of vessels, 131, of 2518 tons; number of boats, 3351; value of catch, 2,655,795 dollars. In 1871 the total value of manufactured products was 17,367,687 dollars. In 1874, there were in operation 456 miles of railway. Around the coasts and along the banks of the rivers there are excellent public and coach roads. Chief towns, the city of St John and Fredericton, the political capital.

The province of N. B., together with that of Nova Scotia, originally formed one French colony, called Acadia, or New France. It was ceded to the English in 1713, and was first settled by British colonists in 1764. In 1784 it was separated from Nova Scotia, and erected into an independent colony. It joined the Dominion of Canada in 1867.

**NEW CALEDONIA**, an island of the South Pacific Ocean, belonging to France, and lying about 720 miles east-north-east of the coast of Queensland, in Australia, in latitude  $20^{\circ}$ — $22^{\circ}$   $30'$   $N.$ , long.  $164^{\circ}$ — $167^{\circ}$   $E.$  It is about 200 miles in length, 30 miles in breadth, and has a population estimated at 60,000. It is of volcanic origin, is traversed in the direction of its length, from north-west to south-east, by a range of mountains, which in some cases reach the height of about 6000 feet, and is surrounded by sand-banks and coral-reefs. There are secure harbors at Port Balade and Port St Vincent, the former on the north-east, the latter on the south-west part of the island. In the valleys the soil is fruitful, producing the cocoa-nut, banana, mango, bread-fruit, &c. The sugar-cane is cultivated, and the vine grows wild. The coasts support considerable tracts of forest, but the mountains are barren. The inhabitants, who resemble the Papuan race, consist of different tribes, some of which are cannibals. N. C. was discovered by Captain Cook in 1774. In 1853 the French took possession of it, and it has since 1872 been used by the French authorities as a penal settlement. Missionaries have been established on the island, and many of the natives are said to have embraced Christianity.

**NEWCHURCH**, a very thriving town of Lancashire, England, 19 miles north from Manchester, in Rosendale, not far from the source of the Irwell. It has recently and rapidly risen to its present importance. There are numerous cotton and woollen manufactories, employing many operatives. Coal is also wrought in the neighborhood, and there are numerous large quarries of excellent freestone. Pop. about 4000. The neighborhood is very populous, abounding in manufactories and other public works.—Not much more than a mile to the west of N., is Rawtenstall, a large village, now almost a town, and rapidly increasing.

**NEW COLLEGE**, Oxford. The College of St Mary of Winchester, in Oxford, commonly called New College, was founded by William of Wykeham, Bishop of Winchester and Lord High Chancellor in 1386. The buildings are magnificent, and the gardens of great beauty. The most remarkable peculiarity of New College is its connection with Winchester School, another noble foundation of Wykeham. After the kin of the founder (to whom a preference was always given), the fellows were to be taken from Winchester. The late practice was that "two founders," as they were called, were put at the head of the roll for Winchester, and two others at the head of the roll for New College. In 1861, the college consisted of a warden and 70 fellows (elected in this way from Winchester), 10 chaplains, 3 clerks, and 16 choristers. By the ordinances under 17 and 18 Vict. c. 81, considerable changes were introduced, but the connection of the college with Winchester was in great measure preserved. The number of fellows was fixed at 30. Of these, 15 are open only to those who have been educated at Winchester, or who have been for 12 terms members of New College. The other 15 are open without restriction. The value of the fellowships is not to be more than £200 per annum, so long as their number is less than 40. There are also to be 30 scholarships, tenable for five years, of value not less than £80 per annum, inclusive of rooms, to be appointed by the warden and fellows of New College, by the election of boys receiving education at Winchester School. No conditions of birth are to be regarded in the election either of fellows or scholars. By a subsequent statute, the chaplains are made 8 in number, and from 8 to 10 choral scholars are added, to be upon an equality with the other scholars. This college presents to 40 benefices, and elects the warden of Winchester College.

**NEW ENGLAND**, a collective name given to the six eastern states of the United States of America—Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut—including an area of 65,000 square miles. The people distinctively known as Yankees, and mostly descended from an English Puritan and Scottish ancestry, are engaged in commerce, fisheries and manufactures, and are celebrated for industry and enterprise. This region was granted by James I. to the Plymouth Company in 1606, under the title of North Virginia, and the coast was explored by Captain John Smith in 1614. See accounts of the several States.

**NEW FOREST**, the name of a district in Hampshire (q. v.), triangular in shape, and bounded on the w. by the river Avon, on the s. by the coast, and on the n. e. by a line running from the borders of Wiltshire along the Southampton Water. Area about 64,000 acres. This triangle appears to have been a great wooded district from the earliest times, and its present name dates from the Norman Conquest, when it was regularly afforested. Since that period it has remained a possession of the crown, subject to rights of "pannage," vert (greenwood) and turf-cutting, claimed by various estates in or near the Forest. During the "pannage" month, which commences at the end of September, and lasts for six weeks, the borderers drive in herds of swine to feed on the mast in the Forest, and this right they obtain by paying a small annual fee in the Stewarts Court at Lyndhurst, which is considered the capital of the Forest. Formerly, this district was the haunt of numerous "squatters," but their huts are now rarely to be seen. Gipsies, however, still congregate here in considerable numbers. In 1854, a commission was appointed to examine the extent and nature of the rights of pannage, &c., claimed by the foresters and borderers, and in a large majority of cases the claims were confirmed. The principal trees in the forest are the oak and beech, with large patches of holly as underwood. The oaks have been much used as timber for the British navy. Tracts of exquisite woodland scenery are everywhere to be met with. The afforestation of this district by the Conqueror, enforced by savagely severe Forest laws, was regarded as an act of the greatest cruelty, and the violent deaths met by both of his sons, Richard and William Rufus—both of whom were killed by accidental arrow-wounds in the Forest—were looked upon as special judgments of Providence. A small breed of poultry lives wild under its shelter.

**NEW GRANADA**, since Sept. 1861, has been officially styled *The United States of Colombia*. This federative republic was formed at the convention of Bogota at the date specified, and consists of nine "states," Panama, Santander, Cauca, Boyacá, Cundinamarca, Antioquia, Tolima, Bolívar, Magdalena. It is bounded on the n. by the Caribbean Sea; on the w. by Costa Rica, a republic of Central America, and by the Pacific; on the s. by Ecuador and Brazil; and on the e. by Venezuela. Area, 618,783 square miles; pop. (1870) 2,594,992, of whom nearly a half are of European descent. By a constitution dated May 1863, the executive authority is vested in a president elected for two years, while the legislative power rests with a Senate and a House of Representatives. The federal army of this republic consists of 8000 men on the peace footing, but in a time of war each state is bound to furnish a contingent of one in a hundred of its population. The revenue in 1875 was 4,583,800 dollars, and the expenditure 7,271,933. The public debt in the same year was close on 16,000,000 dollars. The total imports in 1876-7 had a value of 6,709,109 dollars; the exports, 10,349,071. Besides the railway across the Isthmus of Panama, there is another short line; and about 1250 miles of telegraph are in operation.

The country is intersected by three great ranges of the Andes, which spread out like the rays of an open hand from the plateau of Pasto and Tuquerre in the south (14,000 feet high), and are known as the Western, Central, and Eastern Cordillera. Between these chains lie the long and beautiful valleys of the Cauca and the Magdalena. The Central Cordillera is the highest chain, rising in Nevada de Tolima to a height of 18,020 feet, and from one of its peaks, near the frontiers of Ecuador, called Paramo de las Papas, descend the two principal rivers of N. G., the Magdalena and its tributary the Cauca, flowing north into the Caribbean Sea, besides several affluents of the Amazon in the east, and one or two streams flowing westward into the Pacific. The Eastern Cordillera is by far the largest chain, and consists of a series of vast table-lands, cool and healthy, where the white race flourishes as vigorously as in Europe. This temperate region is the most densely peopled

portion of the Confederation, being, in some places, at the rate of 2600 to the square league. Bogota (q. v.), the present capital, is situated on one of these plateaux, at an elevation of 8694 feet. Eastward from this Cordillera stretch enormous plains as far as the Orinoco, the greater part of which belongs to N. G., and through which flow the Meta, the Guaviare, and other tributaries of the Orinoco. The geology of the country is very extraordinary. "Everywhere," we are told, "are found traces of stupendous cataclysms, and a disarrangement and intermixture of primitive and sedimentary rocks, which seem to put all classification at defiance." In the course of one day's journey, the traveller may experience in this country all the climates of the world. Perpetual snow covers the summits of the Cordilleras; while the rich vegetation of the tropics covers the valleys. With its great variety of levels and climates, N. G. yields naturally an equally great variety of productions: cattle, horses, wheat, and other European grains, maize, tobacco, coffee, plantains, cotton, cacao, sugar, cedar, mahogany, cinchona bark, ipecacuanha, gold, silver, copper, iron, and lead, coal, emeralds, pearls, and rock-salt.

By the constitution, complete toleration in matters of religion and worship, the freedom of the press, a system of parish-schools, with gratuitous primary education, and many other important helps to civilisation and liberty have been established. The inhabitants rank first among the South Americans in point of literary and scientific culture. There are at present about 1000 public schools in the country, many seminaries and colleges for higher and professional instruction; there are printing establishments, periodicals, and numerous literary, scientific and benevolent institutions.

The chief aborigines of the country, called *Chibchas* or *Myscas*, held a high rank among the semi-civilised nations of the New World. They are said to have been frugal and industrious, with a well-organised government and a very passable religion—for heathens. They were conquered by Ximenes de Quesado (1536-1537), and their descendants are now "Christians," and speak the Spanish language. Several of the other tribes still maintain a savage mode of life; and some, as the *Mesqueros*, are even said to be cannibals. In 1718, N. G. was erected into a viceroyalty by Spain. In 1819, it became independent, and then joined with Ecuador and Venezuela to form the republic of Colombia; but the union was dissolved in 1829-1830, and N. G. was organised as a separate republic in 1832. After several changes in the constitution (in 1843, 1851, 1853), a complete fundamental change was made in 1858, by which the separate "provinces" were changed into "states," associated under a federal government like the "United States" of North America, but self-governing in all internal affairs. In 1860, another revolution broke out, and for more than two years, the country was devastated by civil war. Finally, on the 29th September 1861, a convention was concluded between the Conservatives, or Federalists, and the "Liberals," which put an end to the strife. At the victory lay with the latter, certain changes have again been made in the constitution, and the country is now, as stated above, officially designated the "United States of Colombia." The first president under the new form of the constitution commenced his term of office on April 1, 1864.

#### NEW GUINÆA. See PAPUA.

NEW HAMPSHIRE, one of the original thirteen United States of America, in lat. 42° 41'—45° 11' n., long. 70° 40'—72° 28' w., is 176 miles long, and on an average 45 miles wide, having an area of 9280 square miles, or 5,959,200 acres. It is bounded n. by Canada, e. by Maine and the Atlantic Ocean, s. by Massachusetts, and w. by Vermont, from which it is separated by the Connecticut River. It has ten counties; the chief towns are Manchester, Portsmouth, Dover, Nashua, Keene, and Concord, the capital. The population, except the recent influx of Irish in the manufacturing towns, is almost entirely descended from the original English and Scottish settlers. It has 18 miles of sea-coast, and one seaport, Portsmouth, at the mouth of the Piscataqua River, with a deep and commodious harbor. Its other chief rivers are the Connecticut and the Merrimack. It is a state of mountains and lakes, much visited by tourists, and called "The Granite State" and "The Switzerland of America." The White Mountains lie in the north central region. Their highest summits are Mount Washington, 6288 feet; and Mount Lafayette, 6500 feet. A notch in the White Mountains, 2 miles long, and in the narrowest part only 23 feet wide, affords

New Harmony  
New Mexico

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passage to a road and mountain stream, and is much visited. The lakes and rivers of N. H. occupy in all about 110,000 acres. Lake Winnepiseogee is 25 miles long by 1 to 10 miles wide with 360 islands, from a few yards to many acres in area, mostly covered with evergreens. The rocky strata consist of metamorphic rocks, mica and talcose slates, quartz, granular limestones, granite, gneiss, and contain magnetic and specular iron ores, beryls, tourmalins, mica, graphite, and steatite or soap-stone. The soil, except in the fertile valleys, is better adapted to pasturage than culture. The winters are long and cold, so that in the mountainous regions mercury sometimes freezes. In the forests are oak, maple, pine, hemlock, spruce, &c. The chief agricultural products are maize, rye, oats, apples, potatoes, and products of the dairy. Numerous waterfalls give motive-power to many cotton factories, woollen, iron, and paper mills, &c. The state has 915 miles of railway, 45 national and 65 savings banks, a college (at Dartmouth), 700 churches, 50 newspapers, an excellent system of free schools, and government and judiciary similar to all the American states. N. H. was settled in 1623 by colonists from Hampshire in England, who suffered during the colonial period from Indian wars and depredations. The state was organised in 1776. It has furnished a multitude of emigrants to the newer and more fertile western states. P.p. (1810) 214,360; (1840) 284,574; (1890) 346,991.

**NEW HARMONY**, a village of Indiana, first settled in 1815 by a German community of religious socialists, called Harmonists, under the leadership of George Rapp. In 1824, the village and domain was purchased by Robert Owen, for an experimental community on his system. After the speedy failure of this society, the property was bought by William Maclure for a School of Industry. It is now a flourishing western village, of (1880) 1,095 inhabitants.

**NEW HAVEN**, the chief city and seaport of Connecticut, U. S., at the head of a bay, 4 miles from Long Island Sound, 76 miles east-north-east of New York. Its broad streets are shaded with elms, and the public squares, parks, and gardens, with its handsome public and private edifices, make it one of the most beautiful of American cities. It is the seat of Yale College (q. v.), which has more than a dozen large buildings and a Gothic library, 150 feet long. There are a handsome custom-house, state-house, hospital, 51 churches, academies and schools, 9 banks, 5 daily papers, and 3 ornamental cemeteries. There are large manufactories of carriages, clocks, and leather, iron and india-rubber works. It has railway and steam-boat connection with New York, &c. Pop. (1870) 50,840; (1890) 62,892.

**NEW HE'BRIDES**, a group of islands in the Pacific Ocean, to the n.e. of New Caledonia, and to the w. of the Fijis, in s. lat. between 14° and 16°, and in e. long. between 167° and 170°. Total area estimated at 2500 sq. in. They are regarded as the most easterly point of the western division of Polynesia. The group embraces Espiritu Santo (65 miles long by 20 broad), Mallicollo (60 miles long by 23 broad), Vati Ambrym, Annatom, Erromango, and Tanna, with an active volcano. Anora, one of the most fertile of the group, disappeared in 1871, leaving no trace. Most of the group are hilly and well wooded, some even mountainous. The most important woods are ebony and sandal; the principal edible products, yams, bananas, cucumbers, coconuts, and sweet potatoes; and the only animal of consequence, a diminutive species of hog, which, when full-grown, is no bigger than a rabbit. The inhabitants, who number about 200,000, are fierce, but excessively dirty and unintelligent. Erromango is a well-known name in missionary history, being the scene of the barbarous massacre of the Rev John Williams—generally called the Martyr of Erromango.

**NEW HOLLAND**, the former name for Australia (q. v.).

**NEW INN HALL**, Oxford. This Hall, with certain gardens adjoining, was presented to the warden and fellows of New College, by William of Wykeham in 1392. The first principal on record occurs in 1493. During the Civil War it was used as a mint for Charles I. It was restored to the purposes of instruction by Dr Cramer, the late principal, who erected a handsome building for the use of the students.

**NEW IRELAND**, a long narrow island in the Pacific Ocean, lying to the north-east of New Britain (q. v.), from which it is separated by St George's Channel; lat. 2° 40'—4° 52' s., long. 150° 30'—152° 50' e. Length about 200 miles; average breadth, 12 miles. The hills rise to a height of from 1500 to 2000 feet, and are richly wooded. The principal trees are cocoas on the coast, and in the interior forests of areca-palm.

The chief products are sugar-cane, bananas, yams, cocoa-nuts. Dogs, pigs, and turkeys abound. The natives are apparently of the same race as the inhabitants of Australia; but our information about them is extremely scanty.

**NEW JERSEY.** one of the original thirteen U. S., in lat.  $38^{\circ} 55'$ — $41^{\circ} 21'$  n., and long.  $73^{\circ} 56'$ — $75^{\circ} 29'$  w., 168 miles long, with a breadth which varies from 59 to 83 miles, containing an area of 8320 square miles, or 5,324,800 acres; bounded n. by New York, e. by the Hudson River and the Atlantic Ocean, s. by the Ocean and Delaware Bay, and w. by Delaware Bay and River, which separate it from Delaware and Pennsylvania. It has 21 counties. The chief towns are Trenton (the capital), Newark, Paterson, Jersey City, Elizabeth, Camden, Hoboken. Its coast-line is 120 miles, or, including bays, 540 miles. Besides its bordering rivers, the Hudson and Delaware, its principal streams are the Passaic, Hackensack, and Raritan. The northern portion of the state is hilly and mountainous. The Palisades, a wall of perpendicular trap-rock, from 200 to 500 feet high, form the western bank of the Hudson River for fifteen miles, and one of the grandest features of its scenery. The central portion of the state is a rolling country, and the southern and eastern portion a sandy plain declining to the sea. Five geological belts cross the state, containing a sandy pine plain with bog iron ore, shelly marls used for manure, glass sand, green-sand or marl, plastic clay, used in making firebricks, metamorphic rocks, argillaceous red sandstone, copper ores, gneiss with specular and magnetic iron ores, red oxide of zinc, and Franklinite iron. Among the most attractive features in the scenery are the Falls of the Passaic, the Delaware Water-Gap, and Schooley's Mountain. Atlantic City, a bathing-place on the sea-coast, connected by railway with Philadelphia, is a fashionable summer resort. The climate is mild, the soil north of the pine plains fertile, the country healthy, except the malarious river-bottoms. The agricultural products of the state are wheat, maize, oats, common and sweet potatoes, apples, peaches, plums, grapes, melons, and garden vegetables for the great neighboring markets of New York and Philadelphia. There are cotton and woollen factories, iron-works, extensive manufactories of machinery, locomotives, carriages, glass, boots and shoes, &c. The state draws a large revenue from 1323 miles of railway, and several important canals, connecting New York and the coal regions of Pennsylvania. There are 4 colleges, normal and free schools, numerous churches, periodicals, and daily papers. The government is similar to those of all the states.

N. J. was settled in 1620 by Dutch and Swedes. Taken by the English, it was ceded by Charles II. to the Duke of York; it was retaken by the Dutch in 1673, and afterwards bought by William Penn and other Friends, who have here numerous descendants. It was the scene of some of the most important military movements of the War of Independence, and of the battles of Trenton, Princeton, Monmouth, and Germantown. Pop. in 1840, 373,306; in 1860, 672,031; in 1880, 1,181,116.

**NEW JOHORE,** formerly Tanjong Putri, a Malay settlement on the southern extremity of the Malay peninsula. Here the rajah or Tummongong of Johore, who is an independent sovereign, occasionally resides. The climate is healthy; large quantities of gambir and pepper are raised in the vicinity; saw-mills on an extensive scale are in operation. Vessels of the largest draught can approach close to the shore. The valuable timbers of these immense forests are yet scarcely known, but must find their way to the Indian, if not European markets, ere long. Population in the N. J. territory about 20,000, chiefly Chinese.

**NEW LONDON,** a city and port of entry, in Connecticut, U. S. of America, on the right bank of the river Thames, 3 miles from Long Island Sound, 40 miles, s.e. of New Haven. It is a rich and handsome town, with a custom-house, 11 churches, academy, public schools, a daily and a weekly paper, 5 banks, several iron-foundries and steam saw-mills, a machine-manufacturing company, a deep secure harbor, protected by a fort of 80 guns, with 20,000 tons of shipping, much of it engaged in the whale fisheries, and railway and steam-boat communications. Pop. (1880) 10,567. It was settled in 1644, and in 1761 burned by General Arnold.

**NEW MALTON.** See MALTON.

**NEW MEXICO,** a territory belonging to the U. S., formerly a state of Mexico, to lat.  $31^{\circ} 22'$ — $37^{\circ}$  n., long.  $108^{\circ}$ — $109^{\circ} 9'$  w., 350 miles from east to west, and 250 to 400 from north to south, with an area of 121,201 square miles; bounded n. by

New Orleans  
New South Wales

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the state of Colorado; c. by the Indian territory and Texas; s. by Texas and Mexico; and w. by Arizona. Its chief towns are Santa Fé, Albuquerque, Taos, Silver City, Mesilla. Its chief rivers are the Rio Grande, which crosses the territory from north to south; the Pecos, a branch of the Rio Grande; the Colorado, on the California boundary; the Gila, which rises in the Rocky Mountains, and flows westwards into the Colorado. These rivers and their branches water broad and fertile valleys, and supply the lack of rain by irrigation. Two great chains of the Rocky Mountains or Cordilleras pass through the eastern portion of the territory from north to south, and lesser mountain-ranges diversify the west, rising to elevations of 12,000 feet. The climate is cold in the elevated regions, hot in the plains, but everywhere dry and healthy. Heavy rains fall in July and August, but the rest of the year is dry. The productions are wheat, maize, fruits, and tobacco, with abundant pasturage. There are numerous mines of gold, silver, copper, iron and salt. Merchandise is transported from St. Louis and Texas in wagon or mule trains. The Indian population consists of 25,263 who sustain tribal relations, and 1300 out of these relations—total, 26,577. The tribes are the wild and predatory Navajoes, Apaches, Utahs, Comanches, &c., who possess large herds of horses, and make perpetual war upon the neighboring settlements. This territory was explored by the Spaniards in 1537, who opened mines, established missions and made some progress in civilising the natives. In 1846, Santa Fé, the capital, was taken by an American expedition under General Kearney. At the close of the war in 1848, N. M. was ceded to the United States, and erected into a territory in 1850. White population in 1870, 90,393; 1880, 108,721.

**NEW ORLEANS**, capital city and port of entry of Louisiana, U. S., on the left bank of the Mississippi River, 100 miles from its mouth, lat.  $29^{\circ} 58'$  n., long.  $90^{\circ}$  w. The city is built on the alluvial banks of the river, on ground lower than the high-water level, protected from inundations by the levees or embankments, which extend for hundreds of miles on both banks of the river. The streets descend from the river bank to the swamps, and the drainage is by canals which open into Lake Pontchartrain, which is on a level with the Gulf of Mexico. The city is long and narrow, extending about six miles along the river, on an inner and outer curve, giving it the shape of the letter S. The older portion, extending around the outer curve, gave it the name of "the Crescent City." N. O. is the great port of transshipment for a large portion of the cotton crop of the southern American States, the sugar crop of Louisiana, and the produce of the vast region drained by the Mississippi and its tributaries. It commands 10,000 miles of steam-boat navigation, and is the natural entrepôt of one of the richest regions of the world. In the fiscal year ended June 1874, the value of imports into N. O. was 14,533,864 dollars; of exports, the value was 93,715,710 dollars. The sugar product in 1873 was 103,341,119 lbs., value 8,122,575 dollars. The custom-house is one of the largest buildings in America. The hotels, theatres, and public buildings are on a magnificent scale. There are a branch mint, 55 hospitals, infirmaries, and asylums, several colleges, Roman Catholic cathedral, 150 churches, 7 daily newspapers, extensive cotton-presses, cotton and sugar warehouses, several banks, and all the facilities for a vast commerce. Besides the great river, N. O. has railways connecting it with the north, east, and west. It is a beautiful, and, but for the very frequent visits of the yellow fever, a healthy city. The visitation of this dreaded epidemic in the lower Mississippi valley in 1878, was one of the most terrible on record. The soil is full of water, so that no excavations can be made. The largest buildings have no cellars below the surface; and in the cemeteries there are no graves, but the dead are placed in tombs or "ovens," above ground. N. O. was settled by the French in 1718; with Louisiana, it was transferred to Spain in 1763; soon after retransferred to France, and sold, with a vast territory drained by the Mississippi and Missouri, by Napoleon I. to the United States in 1803. In 1815 it was successfully defended against a British Army, under General Packenham, by General, afterwards President Jackson. In 1860, Louisiana having seceded from the Union, N. O. became an important centre of commercial and military operations, and was closely blockaded by a Federal fleet. An expedition of gun-boats, under Commander Farragut, forced the defences near the mouth of the river, April 24, 1862; the city was compelled to surrender, and occupied by General Butler as military governor. In 1868, on its cession to the Union, the population was about 8000, mostly French and Spanish; in

1830 it had increased to 27,000; in 1860, to 168,828, and consisted of Americans, French, creoles, Irish, &c.; in 1870, it was 191,418; 1880, 216,060.

**NEW RED SANDSTONE.** A large series of reddish colored loams, shales, and sandstones, occurring between the Carboniferous Rocks and the Lias, were grouped together under this name, in contradistinction to the Old Red Sandstone group, which lies below the Coal-measures, and has a similar mineral structure. Conybeare and Buckland proposed the title *Poikilitic* (Gr. variegated) for the same strata, because some of the most characteristic beds are variegated with spots and streaks of light-blue, green, and buff, on a red base. In the progress of geology, however, it was found that two very distinct periods were included under these names; and the contained fossils of each group were found to be so remarkably different, that the one period was referred to the Paleozoic series under the name Permian (q. v.), while the other, known as the Trias (q. v.), was determined to belong to the Secondary series.

**NEW ROSS,** a seaport and parliamentary borough of Ireland, situated on the estuary of the Barrow, partly in the county of Kilkenny, but chiefly in that of Wexford, distant 84 miles south-south-west from Dublin. It is an ancient town, having been surrounded by walls about the middle of the 13th century. Before the union, it returned two members to parliament, of whom one was withdrawn by the Act of Union. It is now a place of considerable commerce, and the modern part of the town on the Wexford side is built with great regularity and taste. On the Kilkenny side is a straggling suburb called Rosbercon, connected with N. R. by a metal bridge, erected at a cost of £50,137, which has a swivel-pillar in the centre, to allow vessels to pass; formerly, the connection was by a wooden bridge, nearly 700 feet in length. The port is approachable at spring-tides by ships of 800 tons, and at all times by vessels of 600 tons; and there is a communication by river and canal with Dublin, and also with Limerick. The town is managed by a board of twenty-one commissioners. It possesses no manufactures of any importance. Pop. in 1871, 6772.

**NEW RUSSIA.** See **RUSSIA.**

**NEW SHOREHAM.** See **SHOREHAM.**

**NEW SIDERIA,** a group of islands in the Arctic Ocean, lying north-north-east of the mouth of the River Lena, in Eastern Siberia. Lat.  $73^{\circ} 20'$ — $76^{\circ} 12'$  n., long.  $135^{\circ} 20'$ — $150^{\circ} 30'$  e.; area, 20,480 square miles. The principal are Kotelnoi (the largest), Liakov, Fadlevskoi, and New Siberia. The coasts are in general rocky, and are covered all the year round with snow. The islands are very important, on account of the immense multitude of bones and teeth of mammoths, rhinoceroses, buffaloes, &c., which are found in the soil. They are now uninhabited, but there are traces of former inhabitants. Neither bush nor tree is to be seen anywhere.

**NEW SOUTH WALES,** a British colony in the south-east of Australia. It originally comprised all the Australian settlements east of the 135th meridian, but the formation, successively, of the separate colonies of South Australia (1836), Victoria (1851), and Queensland (1859), has reduced it to more moderate dimensions. It is now bounded on the n. by a line which, beginning at Point Danger, in lat.  $28^{\circ} 8'$  s., follows several lines of heights across the Dividing Range till it meets the 29th parallel, which forms the rest of the boundary westward; on the w. by the 141st meridian; on the e. by the Pacific Ocean; and the line separating it from Victoria on the s. runs from Cape Howe, at the south-east of the island, north-west to the source of the Murray (q. v.), and then along that stream, in a direction west by north, to the western boundary of the two colonies. Area, 323,437 sq. m., or somewhat less than four times that of the island of Great Britain; pop. (1871) 503,981, of whom 275,551 were males, and 228,430 females; (1874) 554,273. The more general physical character of the country is described under **AUSTRALIA**. Within the colony of N. S. W. the mountain-range, which girdles nearly the whole island, is most continuous and elevated, and is known as the Dividing Range. The section of this mountain system on the southern boundary of the colony, called the Australian Alps, rises in Mount Kosciuszko to 7308 feet. From this the range extends northward, the water-shed being from 50 to 150 miles distant from the east coast, and thus divides the colony into two slopes, with two distinct water-systems. The rivers on the eastern side descend with great rapidity, and in oblique tortuous courses, their channels often form-



ing deep ravines. Many of them are navigable in their lower course for sea-going steamers. The principal are the Richmond, Clarence, M'Leay, Manning, Hunter, Hawkesbury, and Shoalhaven. The Hunter River, about 60 miles north of Sydney, opens up one of the most fertile and delightful districts in the country. The Dividing Range, which, opposite to Sydney is called the Blue Mountains, being singularly abrupt and rugged, and full of frightful chasms, long presented an impenetrable barrier to the west, and kept the colonists shut in between it and the sea, and utterly ignorant of what lay beyond. At last, in 1813, when the cattle were likely to perish in one of those long droughts that appear to visit this country at intervals of a dozen years, three adventurous individuals scaled the formidable barrier, and discovered those downs on the western slope which now form the great sheep ranges of Australia. A practicable line of road was immediately constructed by convict labor, and the tide of occupation entered on the new and limitless expanse. The numerous streams that rise on the west side of the water-shed within the colony, all converge and empty their waters into the sea through one channel within the colony of South Australia. The southern and main branch of this great river-system is the Murray. The other great trunks of the system are the Murrumbidgee, which is navigable; the Lachlan, at times reduced to a string of ponds; and the Darling. The Macquarie passing through the rich district of Bathurst (q. v.), is a large tributary of the Darling, but it reaches it only in the rainy seasons. The coast-line from Cape Howe to Point Danger is upwards of 700 miles long, and presents numerous good harbors formed by the estuaries of the rivers. Owing to the great extent of the colony, stretching as it does over eleven degrees of latitude, the climate is very various. In the northern districts, which are the warmest, the climate is tropical, the summer heat occasionally rising in inland districts to 120°, while on the high table-lands, weeks of severe frost are sometimes experienced. At Sydney, the mean temperature of the year is about 65°. The mean heat of summer, which lasts here from the beginning of December to the end of February, is about 80°, but it is much modified on the coast by the refreshing sea-breeze. The annual fall of rain is about 50 inches. Rain sometimes descends in continuous torrents, and causes the rivers to rise to an extraordinary height. Sometimes the rains almost fall for two or three years in succession (see AUSTRALIA). The coast, for 300 m. from the northern boundary, is adapted for growing cotton, and in 1863, when a large quantity was grown, the average produce was 130 lbs. per acre; but cotton-planting seems now to have been abandoned. Further south, the climate is more temperate, and is fitted to produce all the grain products of Europe. Immense tracts of land, admirably adapted for agriculture, occur in the south-western interior; while in the south-east coast districts, the soil is celebrated for its richness and fertility. In the north, the cotton and tobacco plants, the vine, and sugar-cane are grown, and pine-apples, bananas, guavas, lemons, citrons, and other tropical fruits are produced. In the cooler regions of the south, peaches, apricots, nectarines, oranges, grapes, pears, pomegranates, melons, and all the British fruits, are grown in perfection, and sometimes in such abundance that the pigs are fed with them. Wheat, barley, oats, maize, and all the cereals and vegetables of Europe are also grown.

Agriculture is thus increasing in importance, though the predominating interest is still pastoral. In 1875-6, there were 36,984 freeholders and leaseholders occupying 13,525,497 acres of land, of which 451,139 acres were under cultivation, 7,771,068 acres inclosed but not cultivated, and the remainder (5,303,290) not inclosed. The largest crops were—wheat (133,610 acres) and maize (117,582 acres). The other crops included oats, barley, rye, potatoes, millet, &c. Considerable attention has been bestowed on the cultivation of the vine and the manufacture of wine. The produce in 1875-6 was 831,749 gallons of wine and 2748 gallons of brandy, besides 168 tons of grapes.

The great produce of the colony is wool, the exports in 1875 amounting to 87,534,280 pounds, valued at £5,651,643. Sheep-farming requires a large capital, together with skill and experience; and the sheep-farmers or squatters form the territorial aristocracy of the colony. All the best pasture-land has long been taken up and rented (for periods of 10-15 years) from the crown under certain conditions. Stations, or the right of grazing, with the stock on them, are continually advertised for sale; the price of a station is according to the number of cattle or sheep on it. The question of the rent that the "squatters" should pay (which used

to be about £10), and of the tenure by which the pasture-lands should be held, was long a source of agitation and bitterness in the colony. They now pay about a farthing a year for each sheep the run can support. According to the present regulations, arable lands are disposed of by two distinct systems of sale: one, to the highest bidder at auction in unlimited quantities; the other, at a fixed price in limited quantities. By this last, known in the colony as "Free Selection before Survey," the intending cultivator can first select for himself, and then secure in fee-simple a quantity not less than 40, and not more than 320 acres, at the rate of 20s. per acre, on condition of residing on his farm, improving a portion of it, and not subletting it.

The coal-fields of N. S. W. are extensive, and the seams of great thickness. In 1874, 1,253,475 tons, valued at £766,133, were raised. Iron, lead, copper and oil-shale are abundant. Gold was discovered here in May 1851, and in that year gold was exported to the amount of £463,336. This amount was increased to £2,660,946 in 1852, but subsequently, owing to the discovery of the richer diggings of Victoria, gold-mining in this colony began to languish. Since 1857, however, the annual amounts found and exported have been steadily increasing; that for 1869 being 24,383 oz., valued at £386,749; and in 1875, the value exported was £2,094,505, nearly all coin. In 1875 there were in the colony 22,872,882 sheep, 2,666,699 cattle, and 346,691 horses. In 1871, the revenue was £4,709,010; the expenditure £4,179,940; in 1875, the revenue amounted to £4,126,303, and the expenditure to £3,845,632. The exports in 1875 amounted to £13,671,590, comprising barley, oats, potatoes, live-stock, preserved meat, leather, wool, tallow, coal, gold-dust, and sovereigns: the imports, consisting largely of articles for food and clothing, &c., were £13,490,300. The Sydney branch of the Royal Mint was instituted in 1855, and issues large quantities of gold in sovereigns and half-sovereigns. There were in 1876 about 509 miles of railway already open in the colony, while about 200 miles additional were in course of construction. There is telegraphic communication between all the important places in the colony, and also with other colonies; length of wire in 1876, 8012 miles. N. S. W. is self-governed, with a governor appointed by the Queen, a responsible ministry, a legislative council nominated by the crown, and a House of Assembly elected by permanent residents. As regards religion, all sects are on a footing of equality. On Jan. 1, 1876, there were 1089 regular places of worship, affording accommodation to 57,000 Episcopalians, 50,000 Roman Catholics, 24,000 Presbyterians, 44,000 Methodists, &c. The number of schools under the Council of Education, in 1875, was 1042; besides these there are 544 private schools. There were, in all, 123,000 scholars. For the higher education, see SYDNEY. The capital is Sydney, with a pop. of 154,494; and the other chief towns are Paramatta, Bathurst (q. v.), Goulburn, Maitland, Newcastle, Grafton and Armidale, with populations ranging from 3000 to 17,000.

N. S. W. took its origin in a penal establishment, formed by the British Government in 1788 at Port Jackson, near Botany Bay (latitude 34°). The prisoners, after their period of servitude, or on being pardoned, became settlers, and obtained grants of land; and these "emancipists" and their descendants, together with free emigrants, constitute the present inhabitants. Transportation to N. S. W. ceased in 1840, and up to that date, the total number of convicts sent thither amounted to 60,760, of whom only 8700 were women. They were assigned as bond-servants to the free settlers, who were obliged to furnish them with a fixed allowance of clothing and food. In 1833, there were 25,000 free males and 18,500 free females, to 22,000 male and 3700 female convicts; and of the free population, above 16,000 were emancipists. The following table shows the recent rate of increase in the population:

	Males.	Females.	Total.
1860 .....	154,575	110,923	265,503
1861.....	202,099	156,179	358,278
1871.....	275,551	228,430	503,981

The increase of population in Sydney, within the past ten or twenty years, has been over 33.5 per cent.; and in the suburban districts it has been about 60 per cent.

**NEW STYLE.** See CALENDAR, DATE.

**NEW SWINDON.** See SWINDON.

**NEW-YEAR'S DAY**, the first day of the year. The custom of celebrating by some religious observance, generally accompanied by festive rejoicing, the first day of the year, appears to have prevailed among most of the ancient nations. The Jews, the Egyptians, the Chinese, the Romans, and the Mohammedans, although differing as to the time from which they reckoned the commencement of the year, all regarded it as a day of special interest. In Rome, the year anciently began in March; and when Numa, according to the ancient legend, transferred it to the 1st of January, that day was held sacred to *Janus Bifrons*, who was thus supposed to turn at once back upon the old year and forward into the new. On the establishment of Christianity, the usage of a solemn inauguration of the New Year was retained; but considerable variety prevailed, both as to the time and as to the manner of its celebration. Christmas Day, the Annunciation (25th March), Easter Day, and 1st March, have all, at different times or places, shared with the 1st of January the honor of opening the New Year; nor was it till late in the 16th c., that the 1st of January was universally accepted as the first day of the New Year. The early fathers—Chrysostom, Ambrose, Augustine, Peter Chrysologus, and others—in reprobation of the immoral and superstitious observances of the pagan festival, prohibited in Christian use all festive celebration; and, on the contrary, directed that the Christian year should be opened with a day of prayer, fasting, and humiliation. The mandate, however, was but partially observed. The festive character of the day, generally speaking, was pertinaciously preserved, but the day was also observed as a day of prayer; and this character was the more readily attached to it when the year began with the 1st of January, as that day, being the eighth after the nativity of our Lord, was held to be the commemoration of his circumcision (Luke ii. 21).

The social observances of the first day of the New Year appear to have been in substance the same in all ages. From the earliest recorded celebration, we find notice of feasting and the interchange of presents as usages of the day. Suetonius alludes to the bringing of presents to the capital; and Tacitus makes a similar reference to the practice of giving and receiving New Year's gifts. This custom was continued by the Christian kingdoms into which the Western Empire was divided. In England we find many examples of it, even as a part of the public expenditure of the court, so far down as the reign of Charles II.; and, as all our antiquarian writers mention, the custom of interchanging presents was common in all classes of society. In France and England it still exists, although eclipsed in the latter country by the still more popular practice of Christmas gifts. In many countries, the night of New Year's Eve, "St Sylvester's Eve," was celebrated with great festivity, which was prolonged till after 12 o'clock, when the New Year was ushered in with congratulations, complimentary visits, and mutual wishes for a happy New Year. This is an ancient Scottish custom, which also prevails in many parts of Germany, where the form of wish—"Prosst (for the Lat. *prostit*)-Neu-jahr"—"May the New Year be happy"—sufficiently attests the antiquity of the custom. In many places the practice of tolling bells at midnight, and thus "ringing in the New Year" is still observed. Many religious communions are wont to celebrate it with a special service. In the Roman Catholic Church, the *Te Deum* is still sung at the close of the old year; and New-Year's Day is a holiday of strict obligation.

**NEW YORK**, one of the thirteen original states of the United States of America, now the most important in population and wealth, occupies an irregular triangular area from the Atlantic Ocean to the great lakes, lat.  $40^{\circ} 29' 40''$ — $45^{\circ} 0' 42''$  n., long.  $71^{\circ} 41'$ — $79^{\circ} 47' 25''$  w. The state is 413 miles from east to west, 311 from north to south, with an area of 47,000 square miles, or 30,800,000 acres; bounded n. by Lake Erie, Lake Ontario, the river St Lawrence, and Canada; e. by Lake Champlain, and the states of Vermont, Massachusetts, and Connecticut; and by the Atlantic Ocean; s. by the ocean, New Jersey, and Pennsylvania; w. by Pennsylvania, the Niagara River, and the lakes which make its irregular north-western boundary. The state has 60 counties. Its chief towns are New York City, Albany (the capital), Buffalo, Rochester, Oswego, Troy, Hudson, Syracuse, Utica, &c. Pop. (1870) 4,573,063, of whom 1,000,000 are of foreign birth, 500,000 being Irish, and about 250,000 Germans. N. Y., though resting only one corner upon the Atlantic, has its sea-coast extended by Long Island, Staten Island, &c., to 246 miles; while it has a lake coast of 353 miles, and borders for 281 miles on navigable rivers. The Hudson, broad and deep, with tides flowing 160 miles, joins at Albany a system of canals, which connect

New York City with the great western lakes and the river St Lawrence. The state is also traversed by railway lines in every direction. The centre is beautified by many picturesque lakes, and its north-eastern portion and the banks of the Hudson by the mountain scenery. The Blue Ridge of the Alleghenies forms the Highlands, whose peaks rise 1500 feet from the Hudson; north of these, the Catskills rise to a height of 3300 feet, with a large hotel for summer visitors at an elevation of 2000 feet; while Mount Marcy and Mount Anthony, peaks of the Adirondacks, in the wild region west of Lake Champlain, are 5337 and 5000 feet high. The chief rivers, besides the Niagara and St Lawrence, are the Hudson, its chief branch the Mohawk, the Genesee, and the sources of the Delaware Susquehanna, and Alleghany. Its geology presents a series of older rocks, from the Azoi to the lower members of the Carboniferous. Red sandstone of the Middle Secondary period is found on the borders of New Jersey; drift and boulders are found everywhere; the great Silurian belt passes along the eastern line, and granite with iron occurs in the north-east. There is no coal, but rich beds of marble near New York City; productive salt springs in the centre of the state, which yielded, in 1874, 6,594,191 bushels; and petroleum and natural gas, enough in some cases to light large villages, in the west. Among the mineral springs, those of Saratoga and Ballston have a wide reputation. The climate, mild on the coast, is cold in the northern counties. The soil, particularly of the western and limestone regions, is very fertile, producing the finest wheat, maize, apples, peaches, melons, grapes, &c., in abundance. In 1870 N. Y. state produced 5,614,205 tons of hay, 12,178,462 bushels of wheat, 35,293,625 of oats, 16,462,825 of maize, 17,553,681 lbs. hops, 6,692,040 lbs. maple sugar, 22,769,964 lbs. cheese, 10,599,225 lbs. wool. Among the natural curiosities are the Falls of Niagara; of the Genesee, three cascades of 96, 25, and 84 feet in 2½ miles; of the Trenton, which falls 200 feet in 5 cascades; the Taghonic Falls, of 230 feet; and the oft-painted Falls of the Kaaterskill, 175 and 85 feet, in a gorge of the Catskill Mountains. In 1870, there were 36,206 manufacturing establishments, employing 351,800 persons, and a capital of \$366,994,320; and in 1875 there were 5442 miles of railway in the state; the Erie Canal is 350 miles, and the New York canals together 856 miles; 351 banks of issue have a capital of \$124,659,000. In 1870, there were 5474 churches; 11,678 public schools, attended by 719,181 pupils; 274 classical, professional, and technical schools, including 7 universities, 24 colleges, and 189 academies, with an attendance of 43,728 pupils; and 1068 boarding and other schools, with an attendance of 99,113 pupils. In 1874, the expenditure for teachers and scholars was \$11,088,981, and the total number of children at school, 1,224,321. The number of paupers supported during the year ending June 1, 1870, was 26,152, at a cost of \$2,661,385. The number of persons convicted of crime during the same period was 5478, of which 2000 were foreign born. There were 635 newspapers and other periodicals—57 daily, 518 weekly, 163 monthly, 19 quarterly; but a large number of these are published in the city of New York, and circulated over the Union. The number of copies issued annually in the state was 471,741,744. In 1874 there were 1055 newspapers and periodicals.

The earliest explorations of New York by Europeans were in 1609 by Hendrick Hudson, who took possession of the country on the river which bears his name for the Dutch; and by Champlain, a Frenchman, who explored Lake Champlain from Canada. It was possessed by the Iroquois, or Five Nations, and the Algonquians. In 1621 the Dutch made a settlement on Manhattan Island, which they bought for \$24, and founded New Amsterdam, now New York. In 1664, N. Y. was taken by the English. In the War of Independence (1776), Washington was driven from New York City, which was held by the British till the end of the war; but Westpoint was held, and Burgoyne, after two severe battles near Saratoga, compelled to surrender. The state constitution was adopted in 1777, and has since been repeatedly amended. The governor is elected for three years, 32 senators for two years, and 123 members of Assembly for one year. In 1825 the opening of the Erie Canal gave a great impetus to trade. Pop. (1800) 536,756; (1820) 1,372,812; (1860) 8,880,735; (1870) 4,862,750; (1880) 5,062,871.

NEW YORK, the most important city and seaport of the U. S., and the third in the civilised world, is situated on the east side of the mouth of the Hudson River, at its confluence with a narrow strait called East River, which opens into Long Island Sound, in the State of New York, 18 miles from the ocean. Lat. 40° 42' 43" N., long.

74° 0' 8" w. The city comprises the island of Manhattan, formed by the Hudson River and the East River, and separated from the mainland by a narrow strait called Harlem River, on the e., and on the w. by Spuyten Duyvel Creek; includes several smaller islands, containing the fortifications in the harbor, and the public institutions in the East River; and also part of the mainland n. of Manhattan Island. The island on which the city is built is  $13\frac{1}{2}$  miles long, and with an average breadth of 3-5ths of a mile, comprising 22 sq. m. A rocky ridge runs through the centre, rising at Washington Heights, 238 feet. The compactly built city extends five miles from the "battery" at its southern point, and is laid out regularly into 141,486 lots. Avenues, 100 feet wide and 8 miles long, in straight lines, are crossed at right angles by streets from 60 to 100 feet wide, extending from river to river. The city is connected with the mainland of N. Y. by bridges across the Harlem River, with Long Island by a fine suspension bridge, and with New Jersey, Long Island, and Staten Island by numerous steam-ferries. Several railways radiate from the city, while the finest passenger steamboats in the world pass up the Hudson, Long Island Sound, and down the Narrows, through the lower bay. The harbor, formed by the upper and smaller bay with its two arms, which almost enclose the city, is one of the finest in the world. There are 80 piers for shipping on the west, and 70 on the east side of the city. The harbor is defended by fourteen forts, mounting 1660 guns. The streets are traversed by many city omnibuses and tramways, which carry millions of passengers annually.

The city is built of brick, brown sandstone, and white marble. Among its finest edifices are the City Hall, Custom-house, Trinity Church, Grace Church, two universities, cathedral, Academy of Music, Cooper Institute, and the numerous great hotels, several of which have accommodation for more than a thousand persons. Of 331 churches, 72 are Protestant Episcopal, 41 Roman Catholic, and the others of all denominations. In 1873 there were 223 public schools and 17 corporate schools, with 236,543 pupils, and the College of the City of New York, formerly the free academy. Besides, there are 35 Roman Catholic schools, and colleges and academies of the religious orders. Columbia College is one of the oldest in the country; the University of the City of New York has been more recently established. Each has departments of law and medicine, and there are two other medical colleges, several theological seminaries, and many private academies. The hospitals and institutions of charity are on a liberal scale; and besides legal outdoor relief, the poor are visited and cared for by a public society, with agents in every district. Among the charities are asylums for insane, blind, deaf and dumb, magdalens, foundlings, &c. The Astor Free Library, founded by John Jacob Astor, has 150,000 carefully selected volumes; the Mercantile Library, 150,000 volumes, with a large reading-room; Society Library, 64,000; Apprentices' Library, 50,000, with rich museums of antiquities; the Cooper Institute, a present to the city by Peter Cooper, has a free reading-room, picture-gallery, art-school, &c. Annual art exhibitions are given by the National Academy of design, Dusseldorf, and International Galleries. The Academy of Music, or Opera-house, has seats for 4700 persons, and eight or ten theatres give nightly entertainment to 20,000. The Central Park, laid out in the finest style of landscape-gardening, is two and a half miles long by three-fifths of a mile wide. Eighteen smaller public parks are scattered over the city. The Croton Aqueduct brings a river of pure soft water from 40 miles distance, which is received in reservoirs of a capacity of 1,600,000,000 gallons, and distributed through 370 miles of pipes, with such a head as to supply public fountains of 60 and 80 feet jet, and the upper stories of most buildings. Eleven markets supply annually 140,000,000 lbs. beef, 25,000,000 lbs. mutton, 56,000,000 lbs. pork, and immense quantities of poultry, game, fish, oysters, fruits, and vegetables. The city government is composed of a mayor, boards of aldermen and councilmen, and bureaux of various departments. The police numbers about 2590, with salaries of \$800 to \$5500 a year. The stations are connected by telegraph, and have lodgings for destitute persons. A sanitary squad has charge of the public health. The Commissioners of Charity and Correction have direction of asylums, hospitals, and prisons. Commissioners of Emigration receive and attend to the wants of immigrants. The volunteer brigade of firemen has been replaced by a paid fire department, which is found to be much more effective for the protection of property. It consists of upwards of 700 men, with above 40 steam fire-engines, and a

large number of telegraph stations. N. Y. is the great centre of American finance and commerce. It receives 66 per cent. of all imports, and sends out 50 per cent. of all exports. The total value of imports in 1873-4 was \$395,133,622; of exports, \$354,993,733. Vessels entered, 6723, of 5,049,618 tons; cleared, 6103, of 4,837,213 tons. The total number of vessels belonging to the port of N. Y. was 6630, of 1,318,523 tons. There were, in 1870, 7624 manufacturing establishments, employing 123,577 hands, the cost for wages being \$63,884,049, and the value of products \$332,351,520. The assessed value of real and personal estate in 1875 was \$1,154,029,176. The number of immigrants that arrived in N. Y. during the year ending June 30, 1874, was 260,814.

N. Y., the Nieu Amsterdam of the Dutch, was founded in 1621; in 1664 it was taken by the English. At the period of the revolution, it was smaller than Philadelphia or Boston; but increased in importance, especially after the completion of the Erie Canal had opened to it the commerce of the west. In 1789, 2086 persons died of yellow fever; in 1832, 3513 of cholera; in 1845, a fire destroyed a large portion of the business part of the city, with a loss of \$18,000,000. In 1741, in consequence of a supposed negro plot to burn the city, 18 negroes were burned at the stake, 20 hanged, and 78 transported. In 1863, in a riot caused by the conscription, the popular fury again turned against the negroes, and numbers were murdered. The mortality of the city is 1 in 35; intramural interments are forbidden, and large cemeteries have been opened on Long Island. Pop. (1890) 1,206,299; but, if the neighboring cities of Jersey and Brooklyn be included, about 2,000,000.

**NEW ZEA'LAND**, a British colony in the South Pacific Ocean, consists of three islands, two large and one much smaller, and of a number of islets scattered round the coasts. These islands, which are named respectively North, South (sometimes also Middle), and Stewart's Island, are situated about 6500 m. w. from the coast of South America, and about 1200 m. s. e. of Australia. The group is irregular in form, but may be said to extend from the south in a north-north-east direction, and, like the peninsula of Italy, resembles a boot in shape. North Island is 500 miles long, and 200 miles in greatest breadth from east to west; Middle Island is 550 miles long, and 210 miles in greatest breadth; Stewart's Island is triangular in shape, and has an area of about 900 square miles. Area of the three islands about 95,000 square miles. The North is separated from the Middle Island by Cook's Strait, which is 18 miles wide at its eastern and 90 miles wide at its western end; the Middle is separated from Stewart's Island by Foveaux Strait, which averages about 20 miles in width. The group extends in lat. from 34° 15' to 47° 30' s., and in long. from 166° to 179° e.; being thus almost the antipodes of the British Isles.

**Coast Line.**—Of the entire coast line of about 4000 miles, nearly 1500 miles is formed by the shores of North Island, which are deeply indented, and contain many excellent harbors. Commencing from North Cape, and going south-east round the island, the chief harbors are Monganui, Wangaroa, the Bay of Islands, Auckland, Mercury, and Tauranga Bays, and the ports of Wellington, Manukau, and Hokianga. On the north and south coasts of Middle Island, which are much broken, the harbors are numerous and excellent; on the eastern coast, the principal harbors are Akaroa, Victoria, and Dunedin. On the coasts of Stewart's Island, there are also good ports.

**Surface.**—The New Zealand Islands are of volcanic origin, and a great portion of the entire area is occupied by mountains, among which are many extinct and a few active volcanoes. In North Island, Mount Ruapahu, the highest summit of the central range, is 9000 feet in height, and is capped with perpetual snow. In the same range is Tongariro, an active volcano, 6000 feet high. A continuous range of mountains runs along the western coast of Middle Island, and assumes the form of tablelands and isolated peaks toward the east. This range rises in Mount Cook to about 14,000 feet. In Southern Island, the greatest elevation is about 3000 feet. In North Island, the mountains are mostly clothed with evergreen forests of luxuriant growth, interspersed with fern-clad ranges, and occasionally with treeless grassy plains; extensive and rich valleys and sheltered dales abound; and in the east of Middle Island there are many expansive plains of rich meadow-land, admirably adapted either for agriculture or cattle-breeding. Water and water-power are found in great abundance in the colony, and the numerous rivers are subject to sudden floods from the melting of the mountain snows. As a rule, however, the streams are short, and

New Zealand  
Newark

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are not navigable for more than 50 miles above their mouths. The chief is Waikato River, in North Island, which, issuing from the Taupo Lake (80 miles long by 20 broad), flows in a northern direction for 200 miles, and reaches the sea on the west coast. In Middle Island, the rivers Clutha, Mataura, and Waiau, all flowing south, are among the chief. Around Lakes Rotomahana and Rotorua are a number of grand and beautiful geysers, which throw up water heated to 2° above the boiling-point. The geology of N. Z. is remarkable in a high degree. The mountains, which are of every variety of outline, are chiefly composed of the lower slate-rocks, intersected with basalt, and mixed with primary sandstone and limestone. Beds of coal and lignite exist, and the former have been to some extent worked.

*Soil, Climate, and Productions.*—Of the whole surface-extent of N. Z. (nearly 70,000,000 acres, little short of the combined area of England and Wales, Scotland and Ireland), one-fourth is estimated to consist of dense forest tracts, one-half of excellent soil, and the remainder of waste lands, scorie-hills, and rugged mountain regions. Nearly 40,000,000 acres are supposed to be more or less suitable for agriculture and cattle-breeding. The soil, although often clayey, has in the volcanic districts more than a medium fertility; but the luxuriant and semi-tropical vegetation is, perhaps, as much due to excellence of climate as to richness of soil. Owing to the prevalence of light and easily-worked soils, all agricultural processes are performed with unusual ease. The climate of N. Z. is one of the finest in the world. The country contains few physical sources of disease; the average temperature is remarkably even at all seasons of the year, and the atmosphere is continually agitated and freshened by winds that blow over an immense expanse of ocean. In a word, the climate much resembles that of England, with half the cold of the English winter; while the summer is longer and somewhat warmer, the atmosphere is more breezy and pure, and there are many more fine days throughout the year. In North Island, the mean annual temperature is 57°; in South Island, 52°. The mean temperature of the hottest month at Auckland is 63°, and at Otago 58°; of the coldest month, 51° and 40°. The air is very humid, and the fall of rain is greater than in England, but there are more dry days. All the native trees and plants are evergreens. Forests, shrubberies, and plains are clothed in green throughout the year, the results of which are, that cattle, as a rule, browse on the herbage and shrubs of the open country all the year round, thus saving great expense to the cattle-breeder; and that the operations of reclaiming and cultivating land can be carried on at all seasons. The seasons in N. Z. are the reverse of ours; January is their hottest month, and June the coldest. All the grains, grasses, fruits, and vegetables grown in England are cultivated in this country with perfect success, being excellent in quality, and heavy in yield; while, besides these, the vine is cultivated in the open air, and maize, the taro, and the sweet-potato are cultivated to some extent in the sunny valleys of North Island. The entire acreage under crop in N. Z. in 1851 was 29,140; in 1856, it was 141,077; in 1876, 2,230,959; while in 1871 the total acreage fenced was 6,778,773. Of the crops, the principal were wheat, oats, barley, potatoes, and sown grass, which, under ordinary circumstances, are grown to great advantage in New Zealand. Besides a few harmless lizards, a small species of rat is the only indigenous four-footed animal found in either of the great islands. Hawks are numerous. The country is destitute of snakes, and possesses no insect so noxious as the English wasp. The pig, introduced by Cook, runs wild, and the red and fallow deer, the pheasant, partridge, quail, &c., and the commoner domestic animals introduced by colonists, thrive well. In March 1874, there were in the colony 99,859 horses, 494,917 cattle, 11,704,553 sheep, 128,921 pigs, and 1,038,198 heads of poultry, besides mules, asses, and goats. Coal is in abundance, and of good quality, as well as iron, gold, silver, tin, copper, &c. are distributed over the colony. For statistics of the quantity of gold exported, see article OTAGO. Valuable timber is in great abundance. In 1877, the revenue (of which the sources are principally customs, receipts, and sale of crown lands), amounted to £8,790,545; the debt of the general government to £90,691,111. In 1875, the debt was under £14,000,000. The exports, consisting principally of wool, corn, gum, preserved meat, and gold, amounted in 1877 to £8,529,251; the wool of that year being valued at £8,112,469. The total exports of gold from 1857 to 1875 were 7,556,293 oz., in value £30,984,786. The imports, consisting of British manufactures, &c., amounted to £6,973,418 in 1877. At the end of 1877 there were 720 miles of railways in opera-

tion, and 427 in course of formation; there were also 7900 miles of telegraphic wires erected, with 142 stations. The revenue of the post-office in 1876 was £129,263.

The colony was divided into the following nine provinces: Auckland, Taranaki, Wellington, Hawke's Bay, Nelson, Marlborough, Canterbury, Otago, and Westland. The provinces were abolished by the colonial parliament in 1875, and a system of counties substituted. The government is administered by a governor appointed by the crown, and a ministry, a Legislative Council nominated by the crown, and a House of Representatives elected by the people. National schools—maintained by a capitation tax of 10s. per child, and not more than £2 per family—various colleges, and a university in Otago, are the principal educational institutions. A very large proportion of the population of European descent can read and write, more particularly in Otago. The principal churches are the Church of England, predominating in Canterbury; the Presbyterian Church, which predominates in Otago and Southland; the Wesleyan; and the Roman Catholic. In 1875, the immigrants into New Zealand amounted to 31,787 persons; the emigrants from it, to 6467; leaving a balance of 25,270 in favor of immigration. The population in 1858 was 59,328; in 1871 256,269; and in 1876, 399,075. The New Zealanders, or Maoris (q. v.), estimated, in 1867, at 38,540, and in 1875, at 45,470, are mostly located in North Island. The military and civil forces of N. Z. are the volunteers, numbering 6080 of all ranks, and the armed constabulary, consisting of 728 men, of whom 84 are mounted. The hospitals and charitable institutions are numerous.

N. Z. was discovered by Tasman in 1642, and was repeatedly visited by Captain Cook, who surveyed the coast in 1770. After the settlement of Port Jackson in New South Wales, the English and American whaling ships had recourse to the coasts of N. Z. for provisions and shelter. N. Z. flax came also to be an article of traffic, and individual Englishmen began to settle on the coasts, and intermarry with the natives, and acquire land in right of their wives or of purchase. Missionary enterprise began in 1814, favored by various chiefs, and the missionaries not only labored to convert the natives, but introduced improved culture among them, and tried to protect them from the injustice, fraud, and oppression of the Europeans that had acquired settlements. A British resident or consul was appointed in 1833, but without authority. To put an end to the state of anarchy induced by a desultory colonisation, and the purchase of lands for a few batches or muskets, a lieutenant-governor was appointed in 1840, and a treaty concluded with the native chiefs, whereby the sovereignty of the islands was ceded to Britain, while the chiefs were guaranteed the full possession of their lands, forests, &c., so long as they desired to retain them; the right of pre-emption, however, was reserved for the crown, if they wished to alienate any portion. Thus N. Z. became a regular colony, the seat of government of which was fixed on the Bay of Waitemata, and called Auckland. The previous year an association, called the New Zealand Company, had made a pretended purchase of tracts amounting to a third of the whole islands, and for a dozen years most of the colonisation of N. Z. was conducted under its auspices. The conduct of the company is considered to have been on the whole prejudicial to the prosperity of the colony; and after a long conflict with the government, they resigned, in 1852, all their claims—which the government had never confirmed—on condition of receiving £268,000 as compensation for their outlay. The unscrupulous way in which the Company and others often took possession of lands brought on, between 1843 and 1847, a series of bloody conflicts with the warlike natives, whose hostility, after having subsided for some time, in 1861 again broke out in a series of intermittent struggles. These continued until, on the withdrawal of the imperial troops, the colonists, from their knowledge of bush life and intensified earnestness, completely subdued the refractory natives, who are now turning their attention to agriculture and trade. In 1852, constitutional government was established, and in 1865 the seat of government was transferred from Auckland to Wellington, the present capital.

**NEW ZEALAND FLAX.** See **FLAX**, **NEW ZEALAND**.

**NEWARK**, a municipal and parliamentary borough of England, in the county of Nottingham, on the Great Northern and Midland Railways, and on a navigable branch of the river Trent, sixteen miles south-west of Lincoln. The parish church, a large and elegant edifice, though often rebuilt, still shows traces of its original Norman character. N. is approached from the north by a causeway a mile and a half long, carried over the flat island formed by the Trent on the west and the Newark branch on the east. The castle of Newark, in which King John died in 1216, was built



**Newark**  
**Newcastle**

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early in the 12th century. N. is said to be the greatest malting town in England; there are flour-mills, breweries, and trade in corn, malt, flour, cattle, wool, and coal. A corn exchange has been recently erected. N. returns two members to parl. Pop. (1871) 12,218.

**NEWARK**, a city and port of entry of New Jersey, U. S., on the west bank of the Passaic River, twelve miles from New York, on the New Jersey Railway. It is a handsome and industrious city; its principal street is two miles long, 120 feet wide, shaded by great elms, and bordering on three public parks. It contains a custom-house and post-office, 95 churches, numerous public schools, 11 banks, 17 newspapers, and extensive manufactories of leather, patent leather, enamelled cloth, carriages, saddles and harness, boots and shoes, clothing, hats, jewellery—1013 establishments producing annually 75,000,000 dollars. It was settled in 1666 by a Puritan colony from Connecticut. N. has 140 vessels of 12,000 tons. Pop. in 1870, 105,059; 1880, 136,508.

**NEWBERN**, a city and port of entry of North Carolina, U. S., on the s. bank of the Neuse River, at its confluence with the Trent, 39 miles from its mouth in Pamlico Sound. It exports tar, turpentine, naval stores, flour, and lumber. Pop. in 1870, 5,849; 1880, 6,443.

**NEWBURGH**, a village of New York, U. S., on the west bank of the Hudson, 41 miles north of New York, amid the grand scenery of the highlands. Its handsome edifices, villas, and gardens, on a gentle slope from the river, command a noble prospect. It contains a court-house, five foundries, a cotton factory, breweries, a railway carriage manufactory, 2 pianoforte manufactories, steam-boiler works, 5 soap factories, 41,000 tons of shipping, a large lumber trade, 23 churches, 5 banks, schools, and academies. It was Washington's headquarters during a critical portion of the War of Independence. Pop. in 1870, 17,014; 1880, 18,049.

**NEWBURY**, a municipal borough and market-town of England, Berkshire, on both banks of the Kennet, seventeen miles west-south-west of Reading. The church, a specimen of the Perpendicular style, was built in the reign of Henry VII.; but the tower was built by John Winchcombe, a clothier and famous citizen of N. in the reign of Henry VIII. Since 1862, an annual wool-market has been held here. In 1862, a new corn exchange was built. N. is best known for two hard-fought battles between the Royalists and Parliamentarian forces which took place—the first in September 1643, the second in October 1644. In the former, victory was undecided; in the latter, the advantage was on the side of the Parliamentarians. Pop. (1871) 6697.

**NEWBURYPORT**, a city and port of entry of Massachusetts, U. S., on the south bank of the Merrimack River, three miles from its mouth, 34 miles north-east of Boston. Lat. 42° 43' 30" n., long. 70° 52' 3" w. It is a pretty town, built on a swell of land rising 100 feet from the river. High Street, three miles long, shaded with trees, a beautiful Mall, and pond of six acres, are its chief ornaments. It has 16 churches, in one of which is the tomb of Whitefield, who died here (1770), 4 banks, 4 manufacturing companies, making 16,000,000 yards of cloth annually, several shipyards, and manufactories of machinery, hats, clothing, &c.; two daily papers, one of which was established in 1793; a free high school, and a free library of 10,000 volumes. Pop. in 1870, 12,595; 1880, 13,538.

**NEWCASTLE**, Duke of, Thomas Pelham Holles, minister of the first two Georges, born in 1692, and representative of the noble family of the Pelhams, played a prominent, but by no means illustrious part in the political history of his time. While a very young man, he succeeded to the family peerage by the death of his father, Lord Pelham, and George I. rewarded his attachment to the House of Brunswick by creating him first, Earl of Clare, and afterwards Duke of Newcastle. He was made Secretary of State when but thirty years old, although the king declared that he was not fit to be chamberlain to the smallest court in Germany. There was much of the absurd and grotesque in his character. Macaulay says of him, that "his gait was a shuffling trot; his utterance a rapid stammer; he was always in a hurry; he was never in time; he abounded in fulsome carresses, and in hysterical tears." Yet this man was during thirty years Secretary of State, and for near ten years First Lord of the Treasury! He served under Sir R. Walpole, retained his secretaryship in the "broad-bottomed administration" in 1744, and in 1754 succeeded his

brother, Mr Pelham, as head of the government. In 1757, he was compelled to take the first William Pitt (afterwards Earl of Chatham) into his ministry, and to give him the lead in the House of Commons, and the supreme direction of the war and of foreign affairs. A succession of brilliant victories followed—N. being only nominal head of the administration—and the great commoner had almost brought the war to a successful termination, when the accession of George III. led to the resignation of Mr Pitt, and the replacement of N., in May 1762, by Lord Bute, as head of the ministry. N. declined a proffered pension, with the remark that if he could no longer serve he would not burden his country. In the Rockingham ministry, formed in 1765, N. filled the office of Privy Seal. He died November 17, 1768. His title descended to Henry, 9th Earl of Lincoln, whose great-grandson,

**HENRY PELHAM-CLINTON**, fifth Duke of **NEWCASTLE**, and twelfth Earl of Lincoln, was born 1811, and educated at Christ-Church, Oxford. He represented South Notts in parliament from 1833 to 1846, when he was ousted by the influence of his father, the fourth duke, for supporting Sir R. Peel in his free-trade measures. He adopted politics as a profession; was a Lord of the Treasury in the brief Conservative administration of 1834—1835; and First Commissioner of Woods and Forests in the Peel administration, from 1841—1846. He was then made chief Secretary to the Lord-Lieutenant of Ireland, but went out of office with his chief a few months afterwards. He succeeded to the dukedom in 1851, and returned to office in 1852, filling the post of Secretary of State for the Colonies (which formerly included the department of war) in the Aberdeen government. The war with Russia broke out, and in June 1854 it was found necessary to create a Secretary of State for War, and the new office was assigned to Newcastle. The "horrible and heart-rending" sufferings of the British army before Sebastopol in the winter months of 1854 raised a storm of popular discontent, and when the House of Commons determined to inquire into the conduct of the war, the duke resigned. Yet, as is now acknowledged, no blame was attributable either to the Ministry for War or his subordinate, Mr. Sidney Herbert. They were called upon to administer a vicious system of military organisation, which broke down under the strain brought to bear upon it. N. was re-appointed Colonial Secretary in the second administration of Lord Palmerston, and held the seals with general approval from 1859 to the year of his death, 1864. In 1860, as Secretary of State for the Colonies, he accompanied the youthful Prince of Wales during a tour in Canada and a portion of the United States, and on his return received the Order of the Garter from the Queen. He died Oct. 1864.

**NEWCASTLE-UNDER-LYME**, a parliamentary and municipal borough of England, in the county of Stafford, 16 miles north-north-west of the town of that name. A branch-railway connects it with the North Staffordshire line, and a branch-canal with the Grand Trunk Navigation. One of its churches, rebuilt early in last century, has a very old square tower of red sandstone. The Free Grammar School has an income of about £100 a year, and was founded in 1602. Hais are the principal branch of manufacture, and silk, cotton, and paper-mills are in operation. N. is surrounded by famous potteries, and coal-mines are worked in the vicinity. Pop. (1871) 15,949.

**NEWCASTLE-UPON-TYNE** the chief town of Northumberland. Lat 54° 58' 11.4" n., long. 1° 36' 36.5" w. It has the privileges of a county of itself. Gateshead, which stands upon the opposite side of the river, though in a different county, and having a separate jurisdiction, is virtually a part of Newcastle. According to the census of 1871, N. contained a population of 123,443, Gateshead, 48,627; making together, 177,070 inhabitants. N. sends two members to parliament.

The Romans had a stationary camp here, called *Pons ÆlII*—one of the chain of forts by which the Wall of Hadrian was fortified. On the withdrawal of the Romans, the deserted camp became the residence of a colony of monks, and the town was called *Moukchester*. Robert, eldest son of the Conqueror, commenced to build a castle here in 1079 or 1080. Hence the modern name of New Castle. William Rufus built his brother's castle, surrounded the town with a wall, and gave the inhabitants peculiar privileges. The present castle, which displays better than any other in England the genius of Norman military architecture, was erected by Henry II. between the years 1172 and 1177. N. being made the rendezvous of the vast armaments which the first three Edwards led into Scotland, it was in their time

surrounded with new walls of unusual strength and magnitude; portions of them yet remain.

The town stands partly upon an elevated platform, and partly upon the north bank of the river. The more ancient houses in the lower part of the town are chiefly built of timber; those in the centre of the town are mostly of stone; but the houses generally are of brick. Chiefly through the instrumentality of one man of humble origin—Richard Grainger—N. has, in modern times, received the addition of many elegant streets, squares, and public buildings. The river is crossed by three bridges—the High-level Bridge; the Redhugh Bridge; and a swing bridge (completed in 1874), one of the largest structures of the kind in the world. The High-level Bridge forms one of the engineering triumphs of Robert Stephenson. It consists of six cast-iron arches, supported upon piers of masonry. The length of the viaduct is 1337 feet, and the height of the railway above high-water mark, 112. It has a broad carriage-way, by which the ordinary traffic avoids the precipitous streets on both sides of the river, with passenger-path on each side, and the railway above. A quay, at which the depth of water at ebb-tide is 22 feet, has been constructed by the corporation, at a cost of over a quarter of a million, or at the rate of about £120 per lineal yard.

There are sixteen churches and chapels in the town connected with the Established Church, and about 60 belonging to other classes of worshippers. The mother-church (St Nicholas) is a noble edifice, chiefly in the Decorated style; its steeple, which is singularly light and bold, is early Perpendicular. In the Guild Hall, an old and somewhat inconvenient building, situated beside the river, the town assizes are opened, and the quarter sessions held. Under the Guild Hall proper there is an exchange for the merchants, shipowners, and brokers of the quay-side. In the Moot Hall, a modern and very handsome Grecian building overlooking the swing-bridge, the town and county assizes are held. A new and very spacious town-hall was built about twenty years ago on a block of ground facing St Nicholas' Church; associated with it are a corn-market and offices for the transaction of the town business. The market for the sale of butcher-meat and vegetables is probably the most spacious and commodious in the kingdom. All the railways entering the town, terminate in a large station near its centre. The jail, a heavy and costly mass of building, occupies a low and confined situation. The central police-station, police-court, and offices, built in 1873, are comprised in a large and handsome structure in Pilgrim Street. The new postal and telegraph office, begun in 1873, is one of the largest and finest of the public buildings in the town. There are two theatres—the Royal (the great ornament of Grey Street, the handsomest street in the town), and the Tyne Theatre in Westgate Street. N. has two monuments—a column, surmounted by a statue of Earl Grey, to commemorate the passing of the Reform Bill, and a bronze statue to George Stephenson.

The corn-market is held on Tuesday and Saturday; the hay-market and the cattle-market on Tuesday. During the year 1873, 81,685 fat cattle, 350,633 sheep and lambs, and 39,585 swine were brought to the cattle-market. A very large market is held every Thursday morning for the sale of butter, bacon, cheese, eggs, and other articles of country produce. Saturday is general market-day. N. is well supplied with surface water, the chief place of collection being Hallington, about 20 miles north-west of the town.

The trade of N. consists chiefly in coal, and in those articles in the production of which great heat is required. The N. coal-trade had its origin in the reign of Henry III. This branch of industry is not now confined to N., but is spread over the greater part of the sea-board of Northumberland and the whole of Durham. Nearly thirty-two millions of tons of coal and coke were produced in the northern coal-field in 1876; of which about seven million tons were shipped to foreign ports. The number of persons employed in connection with the pits may be computed at 80,000. Since the discovery of the Cleveland ironstone, the manufacture of iron has prodigiously increased in the district embraced by the northern coal-field. The make in 1876 was about 830,000 tons. There are annually produced on the Tyne about 8000 tons of steel. Large quantities of lead, the produce of the mines of Alston Moor and Wear-dale, are brought to N. for manufacture. A very large quantity of unrefined lead is also imported from Spain. Having been refined and desilverised, the lead is rolled into sheets and pipes, or converted into shot, litharge, red and white lead. The

value of these imports is about £1,000,000 per annum. Copper, to the extent of £200,000 worth, is annually got from the copper pyrites used at the chemical works of the Tyne.

At N. the railway system had its origin. Here, as might be expected, locomotive and engineering establishments are found upon a great scale. The ordnance works of Sir William Armstrong at Elswick, the western part of N., are well known. Iron ship-building and various branches of engineering are extensively carried on upon the Tyne. N. occupies an important position in the manufacture of soda, bleaching-powder, vitriol, and other chemical products, the annual value of which is about £1,300,000. There are decomposed in the district 200,000 tons of salt per annum. Earthenware is largely manufactured; window-glass and flint-glass have declined; impressed glass is largely manufactured, and plate-glass is made. Glass-staining has attained great perfection. The fire-brick trade is a new industry, which has attained gigantic proportions. About 80,000,000 fire-bricks are annually made, besides gas-retorts and sanitary pipes, which are sent all over the world. About 100,000 grind-stones leave the N. quarries annually. Portland and other cements are made to the extent of 11,000 tons in a year.

The river Tyne, from the sea to N., forms a natural dock for the accommodation of shipping. Three artificial docks have, however, been constructed at a cost of £1,700,000. Within the last twenty years, improvements upon a large scale have been made by the River Tyne Commission. The entrance to, and many parts of the river have been deepened by dredging. The depth of water on the bar has been increased from 6 to 33 feet at low water. In 1876, 10,194 vessels, of 2,871,700 tons, entered the Tyne ports (N. with North and South Shields); and 15,931 of 5,233,120 tons cleared.

Of the benevolent institutions established in N., there are an infirmary, a dispensary, asylums for the blind, the deaf and dumb, and two orphanages. The Literary and Philosophical Society, the Society of Antiquaries, the Natural History Society, the Mechanics' Institution, and the Institute of Mining Engineers (to which has been recently added a large hall, as a memorial of Nicholas Wood, an engineer of celebrity) successfully cultivate their several fields of labor. A College of Physical Science, with four professorships (geology, experimental philosophy, chemistry, and mathematics), was established in 1871, in connection with the university for Durham; and there is also in N., associated with the same university, a college of medicine.

Lords Stowell, Eldon, and Collingwood, Mark Akenside, and Hutton, the mathematician, were natives of N. Intimately connected with it, though not born in it, were Thomas Bewick, the engraver; Robert Morrison, the Chinese scholar; and George and Robert Stephenson.

NEWEL, the central column or spindle formed by the ends of the steps of a circular staircase, and round which the stair winds. In turret-stairs, it is a plain roll; but in Elizabethan and old Scotch castles, there are frequent examples of handsome staircases of this kind with ornamental newels.

NEWFOUNDLAND, an island and province of the Dominion of Canada, lies in the Atlantic Ocean, at the mouth of the Gulf of St Lawrence, separated from Labrador on the north by the Straits of Belle Isle (about 19 miles broad), and extending in lat. from 46° 38' to 51° 37' N., and in long. from 52° 44' to 59° 30' W. In shape it resembles an equilateral triangle, of which Cape Bauld on the north, Cape Race on the south-east, and Cape Ray on the south-west, form the angles. It is 370 miles in length, 290 miles in breadth, about 1000 miles in circumference, and has an area of 40,200 square miles. Pop. (1869) 146,536; (1874) 161,486.

The island, as seen from the sea, presents a wild and sterile appearance. Its surface is diversified by mountains, marshes, barrens, ponds and lakes. The mountains in the Avalon Peninsula (stretching south-east from the main portion of the island, and connected with it by an isthmus of only about three miles in width) rise, in some cases, to 1400 feet above sea-level; while, both here and along the western shore, the height of 1000 feet is frequently reached. The number of the lakes and "ponds" (the latter name being used indiscriminately for a large or a small lake) is remarkable, and it has been estimated that about one-third of the whole surface is covered with fresh water. The "barrens" occupy the tops of

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hills. The coast-line is everywhere deeply indented with bays and estuaries, many of which are spacious enough to contain the whole British navy. Of these inlets, the principal, beginning from the northern extremity of the island, are Harb, White, Notre Dame, Bonavista, Trinity, Conception, St Mary's, Placentia, Fortune, St George's and St John's Bays. These bays vary in length from 25 to 70 miles, are of great breadth, and are lined—as indeed the whole coast is,—with excellent harbors. The rivers, none of which are navigable for any distance, communicate between the lakes of the interior and the shore, and are narrow and winding. The main streams are the Exploit, with its affluent, the Great Rattling, and the Humber. The soil is sterile and unproductive, although there is considerable cultivation along the sea-board of the settled districts, limited principally to the south-east coast; and a large portion of the land around St John's (q. v.) is under cultivation. The great body of the people being employed either in the fisheries or in establishments connected with them, little attention used to be paid to the culture of the soil; but very considerable improvements in this respect have latterly been made by the enterprising islanders. In 1845, the only crops raised were oats and hay; but within recent years, large supplies of grain, vegetable and garden seeds have been imported; and now about 600,000 bushels of potatoes are produced annually, and turnips, hay, carrots, clover, barley and oats are cultivated with success. The island is rich in useful minerals, among which are silver, copper, galena, marble, limestone, gypsum, roofing-slate and coal—the last found only in small quantities. Lead, silver and copper mines are worked, though mining is still in its infancy here. Trees, of which the chief are the fir, birch, willow and mountain-ash, flourish and reach their natural size only in the low and fertile districts.

The fisheries are of two kinds—the "Shore Fishery" and the "Bank Fishery;" the former comprises the shores and bays of N.; the latter comprises a great tract known as the "Banks" of N., from 500 to 600 miles in length, and about 200 miles in breadth. The Banks form the greatest submarine plateau known; the depth of the water is from 20 to 108 fathoms, and the most productive "ground" is said to extend between lat. 49° and 46° N. Great variety of valuable fish is found in the waters around the colony, as the cod, the salmon, herring, &c. The principal articles of export are fish—comprising dry cod, herring and salmon—and cod-oil. Of dry cod, 970,176 quintals, value £810,948, were exported in 1870; 8593 tons of unrefined cod-oil, value £107,818; 404 of refined cod-oil, value £21,068; 4982 of seal-oil, value £176,472; and 265,189 seal-skins, value £55,248. The imports are chiefly provisions, as bread, butter, tea, &c.—cordage and cables, and manufactured goods. The imports and exports for 1874 amounted in value to £1,582,227 and £1,523,341 respectively. The revenue of N. in 1875 was £197,283; the expenditure, £197,494. In 1873, the total tonnage of vessels that entered and cleared the ports was 412,994. N. possessed itself 1301 vessels of 63,185 tons.

The seal affords one of the most important fishing interests of Newfoundland. This industry may commence any day from the 25th of February to the 5th of March, according to the winds—a north-east wind blocking up the coast with ice, which the first strong westerly wind clears away. At the beginning of the present century, the seal-fishing was carried on with vessels of from 80 to 40 tons, manned by 8 or 10 men. Vessels of from 70 to 180 tons, manned by from 25 to 80 men, were substituted for these, the most suitable being vessels of from 120 to 140 tons. About 1866, steamers were introduced into the seal-fishing, and they have proved so serviceable that it is probable that this kind of vessel will, by and by, be used exclusively in these fisheries. In proportion to the population of N., its religious institutions are ample, while education is within reach of all classes, government grants to the district schools being liberal.

There are no railways in the island, and its peculiar configuration renders even road-making a matter of great difficulty. There are no roads across the island; they are confined chiefly to the south-eastern and south-western sea-board. There is weekly communication for nine months in the year between N. and Europe. In the colony and connected with it, 400 miles of lines of telegraph have been constructed, and the Atlantic telegraph has its western terminus on this island.

The early history of N. is involved in obscurity. It was discovered, June 24, 1497, in the reign of Henry VII., by John Cabot; and the event is noticed by the following entry in the accounts of the privy-purse expenditure: "1497, Aug. 10. To

hym that found the New Isle, £10." It was visited by the Portuguese navigator, Gaspar de Cortereal, in 1500; and within two years after that time, regular fisheries had been established on its shores by the Portuguese, Biscayaus, and French. In 1578, 400 vessels, of which 50 were English, were engaged in the fishery. Sir Humphrey Gilbert, with his ill-fated expedition, arrived in St John's Harbor, August 1583, and formally took possession of the island in the name of Queen Elizabeth. In the return voyage, the expedition was scattered by a storm, and the commander lost. In 1621, Sir George Calvert (afterwards Lord Baltimore) settled in the great peninsula in the south-east, and named it the *Province of Avalon*. The history of the island during the 17th and part of the 18th centuries, is little more than a record of rivalries and feuds between the English and French fishermen; but by the Treaty of Utrecht (1713), the island was ceded wholly to England; the French, however, retaining the privilege of fishing and drying their fish on certain portions of the coast. A governor was appointed in 1728. The present form of government, established in 1855, consists of the governor, a legislative council (appointed by the crown), and a general assembly (elected by the people). The coast of Labrador on the mainland, and the island of Anticosti, have been included, since 1809, within the jurisdiction of the governor of Newfoundland.

**NEWFOUNDLAND DOG**, one of the most sagacious and esteemed of the large kinds of dog. It is said to have been originally derived from Newfoundland, where it is used chiefly as a beast of draught, to convey light loads of wood or provisions, on sledges, over rugged tracks. Multitudes of these dogs, in St John's and elsewhere, are left to shift for themselves during the fishing season; and are again called to service when required by their masters. There are several varieties of N. D., particularly a smooth breed, with rather small head, white and spotted with black, which seems now to be extinct; a very large breed, with broad muzzle, head raised, noble expression, waived or curly hair, very thick and bushy curved tail, black and white color; and a smaller, almost black breed. Some of the breeds seem to be crossed with hounds and other dogs. The N. D. is remarkable for memory, and for patience and forbearance of temper. It is, however, apt to become fractious in confinement, and will then bite even its master. Some of the most interesting anecdotes of the affection and sagacity of the dog, relate to the Newfoundland Dog. No dog excels it as a water-dog. Its paws are half-webbed. Its powers of endurance in swimming is very great.

**NEWGATE**, a celebrated London prison, stands at the western extremity of Newgate Street, opposite the Old Bailey. It is the chief criminal prison for the city and county. The exterior presents high dark stone walls, without windows, and with entrances from the side next the Old Bailey, in front of which public executions take place. The earliest prison here was in the portal of the *new gate* of the city, as early as 1218; and hence the name. About two centuries afterwards, it was rebuilt by the executors of Sir Richard Whittington, whose statue with a cat stood in a niche, till its destruction by the great fire of London in 1666. Shortly after, it was reconstructed, from which time, till 1780, the date of the erection of the present edifice, its condition was, in a sanitary point of view, horrible. Mr Akerman, one of the keepers, in his evidence before the House of Commons in 1770, stated, as a proof of this, that in the spring of 1759 the jail distemper, spreading to the adjoining Sessions House, caused the death of "two of the judges, the lord mayor, and several of the jury and others, to the number of sixty persons and upwards." The place, however, is now kept in the cleanest possible condition. The cells for condemned prisoners are at the north-east corner, next to Newgate Street. The "Newgate Calendar" contains biographical notices of the most notorious murderers, burglars, thieves, and forgers who have been confined within its walls.

**NEWMAN**, John Henry, D.D., was born in London, February 21, 1801, and educated at the school of Dr Nicholas, at Ealing, whence he passed, in 1816, to Trinity College, Oxford, of which college he became a scholar by competitive examination in 1818. Having graduated in 1820, he was elected Fellow of Oriel College in 1822, where he attracted the notice of Dr Whately, and was by him employed in the preparation for publication of his well-known "Treatise on Logic," and introduced to the editor of the "Encyclopædia Metropolitana," to which he became a contributor. He was ordained in 1824; and in the following year, his friend Dr Whately

having been appointed head of St Alban's Hall, N. was by him selected as his vice-principal; but on being named tutor in his own college in 1837, as also public examiner, he resigned the vice-principalship. In 1838, he was presented to the vicarage of St Mary's, Oxford, in which church the sermons which he delivered at a late period had an extraordinary influence in forwarding the religious movement with which his name is permanently associated. At this period, N. was an earnest antagonist of the Roman Catholic Church. He was one of those who transferred their support from Sir Robert Peel to Sir Robert Inglis on occasion of the former's introducing the Roman Catholic Relief Bill; and he was one of the most active in commencing and carrying on the so-called Oxford movement—the great object of which was to counteract as well the Romanising as the dissenting tendencies of the time, by restoring and bringing into notice what N. and his friends believed to be the catholic character of the English Church. With this view, he commenced, in 1833, the series known as the "Oxford Tracts," to which he was himself one of the chief contributors; and in 1838, he also became editor of the "British Critic," which was an organ of the same views, and, in conjunction with Drs Pusey and Keble, of a "Library of Translations from the Greek and Latin Fathers." He continued the publication of the Tracts up to the 90th Number, which was written by himself, and the tendency of which was so distasteful to the Anglican authorities, that the Heads of Houses at Oxford condemned the Tract, and the Bishop of Oxford called on N. to discontinue the publication—a request with which he at once complied. The "British Critic" continued for some time longer to advocate the same opinions; but in 1843 that publication also was discontinued; and N., who had for some time resided at Littlemore, near Oxford, engaged, in company with some of his more youthful adherents, in study and ascetic exercises, thenceforward confined himself chiefly to his Littlemore residence, and eventually, in October 1845, was admitted into the Roman Catholic Church, a step which was immediately followed by the publication of a work on the "Development of Doctrine," which was intended as an explanation of the process through which the writer's own mind had passed. Soon afterwards, N. repaired to Rome, where, after some preparation, he was admitted to orders in the Roman Catholic Church; and in 1848, on his return to England, he established a branch of the Congregation of the Oratory of St Philip Neri, of which he was himself appointed the superior. In 1852, he was appointed rector of the Catholic University established in Dublin, an office which he held for five years, afterwards returning to Birmingham, where he still resides, and in connection with which he has established a school of higher studies for the youth of the Roman Catholic religion. Dr N., in addition to the large share which he had in the publications already named, is the author of several very important works, written as well before as after his withdrawal from Anglicanism. Of the former period, are his "History of the Arians," "Prophetical Office of the Church," "The Church of the Fathers," an "Essay on Miracles," a "Translation of the Treatises of St Athanasius," with many learned dissertations, and several volumes of sermons. To the latter period belong the "Development of Christian Doctrine," "Lectures on Catholicism in England," "Apologia pro Vita Sua," "Letter to Dr Pusey," "Essay on Assent," and "Letters to the Duke of Norfolk on Mr Gladstone's Expostulation" (1875). N. is also the author of two works of fiction, "Loss and Gain," and "Callista," a classical and Christian story of the 5th c.; and he edited a series of "Lives of the English Saints."

NEWMAN, Francis William, brother of the preceding, was born in London in 1805, and educated at the school of Ealing. Thence he passed to Worcester College, Oxford, where he obtained first-class honors in classics and mathematics in 1826, and, in the same year, a fellowship in Balliol College. This fellowship, however, he resigned; and he withdrew from the university in 1830, at the approach of the time for taking the degree of M.A., declining the subscription to the Thirteen Articles, which was required from candidates for the degree. After a lengthened tour in the East, he was appointed classical tutor in Bristol College, 1834. In 1840, he accepted a similar professorship in Manchester New College, and, in 1844, his great reputation for scholarship, and his general accomplishments, led to his being appointed to the chair of Latin, in University College, London, which he held till 1863. During all this time, he has not only been an active contributor to numerous literary and scientific periodicals, and to various branches of ancient and

modern literature, but has also had a leading part in the controversies on religion, in which he has taken the line directly opposite to that chosen by his elder brother, being no less ardent as a disciple of the extreme rationalistic school than John Henry Newman of the dogmatical. These opinions, and the system founded upon them, form the subject of his well-known work, "Phases of Faith, or Passages from the History of my Creed" (1880); and of many essays in the "Westminster Eclectic," and other Reviews; but he is also the author of very many separate publications. Of these, several regard the controversy to which we have referred—as, Catholic Union; "Essays towards a Church of the Future" (1844); "A State Church not Defensible" (1846); a "History of the Hebrew Monarchy" (1847); "The Soul, its Sorrows and Aspirations" (1849). Others are on political or social topics—as, "Radical Reforms, Financial and Organic" (1848); "The Crimes of the House of Hapsburg" (1851); "Lectures on Political Economy" (1857); "Europe of the Near Future" (1871). A large number are devoted to historical, classical, and scientific subjects, the most important of which are "Contrasts of Ancient and Modern History" (1847); "Regal Rome" (1852); translations into "unrhymed metre" of the "Odes of Horace" (1853), and the "Iliad of Homer" (1856); a treatise on "Difficulties of Elementary Geography"; "Handbook of Arabic" (1868); "Orthoepey" (1869), &c.

**NEWMARKET**, a market-town of England, famous for its horse-races, is situated in a valley 13 miles east-north-east of Cambridge, and is partly in the county of that name and partly in Suffolk. It contains many well-built and elegant houses, the residences in many cases of gentlemen who are drawn hither from their interest in the *Turf*. The market-house and the famous Jockey Club are the chief edifices. Malt-making and brewing are carried on to some extent; but the town owes its prosperity to the horse-races, and nearly the half of the population are jockeys, grooms, trainers, or stablemen. The race-course of N., owned partly by the Jockey Club and partly by the Duke of Rutland, is said to be the finest in the world, and the training-ground bears a similar character for excellence. There are seven race-meetings held here annually. See HORSE-RACING. The population in 1871 was 4384.

**NEWPORT**, a parliamentary and municipal borough, market-town, and river-port of England, chief town of the Isle of Wight, and situated near the centre of that island, on the Medina, which is navigable up to this point. St Thomas's Church, founded in 1654, on the site of an ancient structure built in the reign of Henry III., is a handsome edifice, and contains a monument erected by Her Majesty in memory of the Princess Elizabeth, daughter of Charles I., who died at Carisbrooke Castle September 8, 1660. Among the educational establishments of N. is the Free Grammar School, in which frequent meetings and negotiations between Charles I. and the Parliamentary Commissioners took place. About a mile north of N. is Carisbrooke Castle, where the king was confined under the guardianship of Colonel Hammond for twelve months (1647—1648). There are several important institutions in the vicinity, as the Albany Barracks, the House of Industry, and the Parkhurst Prison for juvenile convicts. Manufactures of lace are carried on to some extent. Vessels of considerable tonnage can ascend to the quay at high tides. Pop. (1871) 7366.

**NEWPORT**, a thriving market-town, parliamentary and municipal borough, and river-port of England, in the county of Monmouth, and 24 miles south-south-west of the town of that name, on the Usk, and about four miles from the mouth of that river. It was anciently the port of the city of Caerleon, about three miles further up the river; but during the present century, it has become a shipping port of considerable importance, being the outlet of the produce of the extensive collieries, and iron and tin works of the neighborhood. It possesses a number of recently-erected public buildings, has spacious docks, manufactures nails and spikes extensively, exports iron and coal largely, and carries on an excellent general trade. In 1875, 10,243 vessels, of 1,100,891 tons, entered and cleared the port. N. unites with Monmouth and Usk in sending a member to parliament. The remains of Newport Castle are now used as a brewery. Pop. (1871) 27,069.

**NEWPORT**, a city and port of entry, and semi-capital of Rhode Island, U. S., on the west shore of the island of Rhode Island in Narragansett Bay, 5 miles from the ocean. Lat. 41° 29' n., long. 71° 19' 12' w. It has a deep, excellent harbor, de-



fended by Forts Adams and Wolcott. It has a state-house, custom-house, market, the Redwood Library, many large hotels, and elegant villas; is renowned for fine scenery and sea-bathing; and is one of the most fashionable watering-places in America. The town also contains cotton and other manufactures. It was settled, in 1638, by 17 adherents of Roger Williams, who followed him in his banishment from Massachusetts. In 1874, N. had 135 sailing and steam vessels, of 866½ tons. It was for a time the residence of Bishop Berkeley. Pop. in 1870, 12,552; 1880, 15,603.

NEWPORT, a city of Kentucky, U. S., on the Ohio River, opposite Cincinnati, and on the east side of the mouth of the Licking River, opposite Covington. It contains a United States arsenal, and several iron foundries and rolling mills. Pop. in 1870, 15,087; 1880, 20,433.

NEWPORT-PAGNELL, a small market-town of England, in Buckinghamshire, on the Ousel, 60 miles north-north-west of London. Lace is manufactured extensively, and there is a good trade in corn, coal and timber. Pop. in 1871, 3655.

NEWRY, a seaport and parliamentary borough, situated partly in the county of Armagh, but principally in the county of Down, Ireland, distant from Dublin 63 miles north, and from Belfast 38 miles south-south-west, with both which places it is connected by a branch-railway communicating with the Dublin and Belfast Junction Railway. The town is nearly coeval with the English invasion, having grown up around a monastery founded in 1153, and a castle subsequently erected by De Courcay. This castle was the scene of several struggles, and in most of the civil wars of Ulster, N. suffered severely. It was incorporated as a borough, with a corporation and two members of parliament, by James I. Since the Union, it returns but one member, and the corporation having been abolished by the Irish Municipal Reform Act, the affairs of the town are now administered by 21 commissioners. It is traversed by a river of the same name, which falls into Carlingford Lough, and by a canal, by which the navigation is prolonged to Lough Neagh, a distance of 32 miles. A commission has been appointed for improving Carlingford Lough, and to remove the bar; the estimated cost being £80,000. The town is handsomely and compactly built. The quays are lined with spacious warehouses, and there are several mills, tanyards, coach and car manufactories, and iron foundries. Extensive water-works have recently been constructed. Linen, cotton, and iron manufactures are carried on. The income of the port is £6000 yearly. Steam vessels ply to Liverpool and Glasgow from Warrenpoint, a port five miles distant, on Carlingford Lough; and the Newry and Greenore Railway, connecting the Newry and Armagh Line with Carlingford Lough, is in progress. Pop. (1871) 14,158.

NEWSPAPER, a periodical publication printed and distributed for the circulation of news. From the broadsheet relating the most meagre intelligence without comment or inference, the newspaper has gradually grown up into a powerful political, as well as social engine, diffusing information on all subjects of interest, circulating advertisements, and acting on the public mind, in times of excitement, to an extent that has led it to be called a fourth estate of the realm.

The earliest approach to the newspaper is to be found in the "Acta Diurna," or "Acta Publica," of ancient Rome, an official gazette, which in the later times of the republic, and during the empire, appeared daily under sanction of the government. The contents of these "Acta" consisted of an enumeration of the births and deaths in Rome, an account of the money paid into the treasury, and everything relating to the supply of corn; extracts from the "Acta Forensica," including the edicts of magistrates, the testaments of distinguished men, reports of trials, with the names of the acquitted and condemned, a list of the magistrates who were elected; extracts from the "Acta Senatus," an account of public affairs and foreign wars, of the births, deaths, festivals, and movements of the imperial family; and generally, news relating to public buildings, funerals, games, fires, sacrifices, and miracles, as well as amatory stories. The "Acta" seem to have been drawn up under the superintendence of censors, quaestors and other magistrates, by officers called *actuarii*, assisted by clerks and notaries; and their publication consisted in posting them in some public place in the city, where they could be read by any one who pleased. They continued to be issued until the downfall of the West-

ern Empire, but there seems never to have been anything corresponding to them at Constantinople.

The beginnings of the newspaper of modern Europe are traceable to Germany and to Venice. Soon after the invention of printing, in the latter half of the 15th c., small news-sheets, called "*Relationen*," and the "*Neue Zeytung*," appeared in Augsburg, Vienna, Ratisbon, and Nürnberg, generally in the form of a letter. The extant numbers contain, among other matters, accounts of the discovery of America, of the conquests of the Turks, of the French and Austrian war in Italy, with such local occurrences as executions, inundations, earthquakes, burnings of witches, and child-murders committed by the Jews. More important, perhaps, were the official "*Notizie Scritte*," first issued by the Venetian government in the 16th c., containing accounts of the wars carried on by the Republic, and other events of general interest. At first they were not printed, but were to be seen in various public places on payment of a small coin, called a *Gazeta*, whence the name "*Gazette*." After they were allowed by the government to be printed, they obtained a wide circulation over the whole of Europe.

The earliest English newspapers, or news-letters, belong to the reign of James I. and were printed in the form of small quarto pamphlets. Some copies of a sheet, called the "*English Mercury*," purporting to be published by authority of Queen Elizabeth in 1588, the period of the Spanish Armada, have been proved by Mr Watts of the British Museum to be literary forgeries, executed about 1766. The first English newspapers appeared at occasional and irregular intervals—the earliest of them, so far as ascertained, is entitled "*News out of Holland*," and was published for M. Newbery in 1619. In 1622, these occasional pamphlets were converted into the first printed newspaper, entitled "*The Certaine News of the Present Week*," edited by Nathaniel Butter. About the same time appeared the "*London Weekly Courant*." A large number of publications, hardly deserving the name of newspaper, were circulated during the civil war, with such names as "*England's Memorable Accidents*," "*The Kingdom's Intelligencer*," "*Mercurius Aulicus*," "*The Scots Intelligencer*," "*The Parliament's Scout*," "*The Parliament's Scout's Discovery*," or "*Certain Information*," "*The Scots Dove*," "*The Parliament Kite*," "*The Secret Owl*," "*Mercurius Maximus*," "*Mercurius Democritus*," "*Mercurius Acheronticus*, or *News from Hell*," &c. The arrangement of the news is poor in the extreme, and what few comments there are, are of the most virulent description. The Long Parliament subjected the newspaper press to a censorship, which became more strict under Charles II. The first English newspaper which could properly be considered a vehicle of general information, was the "*Public Intelligencer*," established by Sir Roger L'Estrange in 1663; it was dropped on the appearance of "*The London Gazette*," the first number of which was published November 7, 1665, at Oxford, where the court was residing in consequence of the plague being then in London. A second paper, called "*The Observer*," was afterwards started by L'Estrange, who, in 1680, exercised his authority as licensor of the press by issuing a proclamation "for suppressing the printing and publishing of unlicensed news-books and pamphlets of news." Small as was the sheet, a difficulty often arose how to fill it. One publisher was in the way of supplying the dearth of news by a passage from the Bible; another announced that "blank space is left that any gentleman may write his own private business."

Up to the reign of Queen Anne, few of the newspapers appeared oftener than once a week. From the interest excited by Marlborough's victories arose a demand for more frequent intelligence, and besides 17 newspapers published three times a week, the "*Daily Courant*," established in 1709, was issued every day except Sunday. Of the more noted London newspapers, the "*London Daily Post and General Advertiser*" was established in 1726, and in 1753 became the "*Public Advertiser*;" a celebrity attaches to it from having been the medium in which "*Julius's Letters*" first appeared. The "*St James's Chronicle*" arose from an amalgamation of two papers, the "*St James's Post*" and "*St James's Evening Post*," both which began in 1715. The "*North Briton*," edited by Wilkes, first appeared in 1762. The "*Morning Chronicle*," discontinued in 1862, dates from 1770; the "*Morning Post*," from 1772; the now defunct "*Morning Herald*," from 1781; the "*Times*" first appeared in 1788, as a continuation of the "*London Daily Universal Register*," established three years earlier.

During the reign of George III. prosecutions were rife against newspaper writers and editors; their result, generally, was to give a greatly increased currency to the doctrines assailed, and to confer a fictitious importance on the traders in politics, by whom many of the journals were conducted. The first attempt at parliamentary reporting was resented by the House of Commons as a breach of privilege, but the resolutions and the imprisonments of 1771 all ended in the tacit concession of publicity of discussion which has ever since prevailed.

The newspapers of Great Britain have, within the present century, greatly increased in size and improved in literary character. In both respects they are far in advance of the journals of any other country. Each number of the "Times" now consists in general of 16 pages, occasionally 24, and contains upwards of 5000 advertisements. The success of the "Times" is mainly due to the enterprise of its original promoter, Mr Walter, who first introduced various improvements in the art of printing, and made a strong effort to secure the best literary talent attainable in all departments of his journal. One of the most notable incidents in the history of the "Times," was the exposure, through means of its Paris correspondent, of a gigantic scheme of forgery, planned in France in 1840—a scheme which contemplated the almost simultaneous presentation, at the chief banking-houses of the continent, of forged Letters of Credit from Glyn and Co. The failure of the conspiracy was mainly due to the exertions made by the "Times." One of the parties implicated, brought an action for libel against the printer, and obtained a verdict of one farthing damages. A public subscription was raised to defray the expenses incurred in defending the action; when the proprietors of the "Times," declining personally to accept the sum subscribed, invested it in two "Times" scholarships in connection with Christ's Hospital and the City of London School, for the benefit of pupils proceeding thence to Oxford or Cambridge.

The editing of one of the leading London newspapers involves an immense daily expense, and the co-operation of a number of talented writers. The principal editor, as representative of the proprietors, has the whole oversight and responsibility intrusted to him. He occasionally furnishes the leading article, but it is more frequently composed by one of a staff of literary contributors, who are bound on the shortest notice to write on any subject which the editor may assign. The leader is in form a relic of the time when the newspaper was the news-letter; it is its professed object to analyse, condense, and explain public transactions, to scrutinise what is doubtful or suspicious in the conduct of public men, and to expose sophistry and imposture. Under the editor are various sub-editors, having the superintendence respectively of the London, the provincial, the foreign, the literary, the industrial and other departments. The commercial article is furnished every evening by a contributor in the City. There are twelve to sixteen parliamentary short-hand reporters, who are continually relieving one another, besides reporters attached to the courts of law, and correspondents who furnish accounts of public meetings, and local news of various kinds. The foreign intelligence, a most important department in the great London journals, is furnished by correspondents in all parts of the world, some of them, particularly those employed in time of war, being men of very high reputation in the literary world.

A stamp-duty on newspapers was imposed in 1713 by 10 Anne, c. 19, amounting to one halfpenny on "half a sheet or less," and one penny "if larger than half a sheet, and not exceeding a whole sheet." The duty was raised  $\frac{1}{2}$ d. by 30 Geo. II. c. 19; another halfpenny was added by 16 Geo. III. c. 24; still another by 29 Geo. III. c. 50; and a further addition of  $\frac{1}{2}$ d. was made by 37 Geo. III. c. 90, amounting to 4d. in all. Act 6 and 7 Will. IV. c. 76, reduced the stamp-duty to 1d., with the addition of  $\frac{1}{2}$ d. or 1d. when the sheet contained upwards of 1550, or of 225 square inches on each side. An additional  $\frac{1}{2}$ d. was chargeable on a supplement. By 15 and 19 Vict. c. 27, passed in 1855, the newspaper stamp was abolished, a change which occasioned an immense increase in the number of newspapers, and diminution of their price, though many of the cheap papers then started were of very brief duration. The repeal of the paper-duty, which took effect on October 1, 1861, also added, though to a much less considerable extent, to the number and cheapness of newspapers. The number of stamps issued on British newspapers was  $7\frac{1}{2}$  millions in 1753, 16 millions in 1800, and 65,741,271 in 1850.

In 1843, the number of newspapers published in London was 79; in 1877 it was

about 320. 19 of these are daily papers, 6 of them published in the evening, and two out of the 6 mere reprints of the morning papers, with what news had been received during the day. Of these, the most influential for 40 years back has been the "Times," established in 1788, of which nearly 70,000 copies are printed daily, and its circulation has been larger on occasions of public interest. It professes independence in politics. The "Daily News," "Pall Mall Gazette" (an evening paper), "Daily Telegraph," and "Morning Post" are the most important Liberal daily papers, the last named being also the organ of the fashionable world, while the "Standard" and "Globe" (an evening paper), represent the Conservative party.

The price of the daily papers varies from  $\frac{3}{4}$ d. to 8d. Of the 300 newspapers not daily, most are published once, some twice, some three times, one four times a week, some once a fortnight, and some monthly. They comprise agricultural, sporting, commercial, and railway journals; a dozen or so purely literary, or literary and scientific; military and naval, musical and theatrical, legal and medical journals. There is a "Court Circular," and a "Court Journal," a French, a German, an Anglo-American, and a Spanish weekly paper. There are a few pictorial and about half-a-dozen humorous papers. Of these last, "Punch," which has been in existence since 1841, is ably conducted, and wields no small influence. A large number are the organs of particular religious sects or parties. The bakers, drapers, grocers, printers, booksellers, brewers, &c., have their respective journals; the builders have six; and there are many newspapers with a purely local circulation, some confined to the obscure quarters of London. The price of the weekly papers varies from 6d. to 1d. or  $\frac{3}{4}$ d.

The earliest English provincial newspaper is believed to be the "Norwich Postman," published in 1706, at the price of a penny, but "a halfpenny not refused." It was followed, in 1714, by the "Norwich Courant, or Weekly Packet." A "York Courant," "Leeds Courant," and "York Journal" were established about 1720; the "Manchester Gazette" in 1730, and the "Oxford Journal" in 1740. In 1843, 212 newspapers were published in provincial towns of England, and 8 in Wales. The provincial newspapers of England numbered in 1877 about 980, besides 56 belonging to Wales, and 20 to the Islands. About a fifth of the number profess Conservative or Liberal-Conservative principles, a half Liberal, a small number perfect independence in politics, and the rest are avowedly neutral. Only a very few of these are conducted with anything like ability. Among the more important are the "Manchester Examiner," which is understood to have a circulation of 35,000, and the "Newcastle Chronicle" of 36,000, and the "Manchester Guardian." A characteristic feature of many second-class provincial papers is a column of gossip or scandal, entitled a letter "From Our London Correspondent."

The newspaper press of Scotland began during the civil wars of the 17th century. A party of Cromwell's troops, who arrived at Leith in 1652 to garrison the citadel, brought with them a printer named Christopher Higgins, to reprint the London paper, "Mercurius Politicus." The first number was issued on the 26th October 1653, and in November 1654 the establishment was transferred to Edinburgh, where the reprinting went on till 1660. On the 31st December 1660, the first number was published of the "Mercurius Caledoniensis," which professed to furnish information regarding the "affairs in agitation in Scotland, with a survey of foreign intelligence." It lived only three months, and was succeeded by "The Kingdom's Intelligencer." The "Edinburgh Gazette," an official paper published by authority, was established in 1660 by James Watson, a printer of eminence and skill. In 1702, Watson also started the "Edinburgh Courant," which attained its 215th number, and in 1706 the "Scots Courant." In 1718 the town-council of Edinburgh gave a privilege to James M'Laren to print the "Edinburgh Evening Courant" three times a week, on condition that before publication, he should give "one coppie of his print to the magistrates." This paper still exists as the "Edinburgh Courant," now a daily paper, and the principal Conservative journal in Scotland. The "Caledonian Mercury," now defunct, was first published on the 28th of April 1730. The "Scotsman," which came into existence in 1817, under the conduct of Mr Charles Maclaren, and was for a short time edited by Mr J. R. McCulloch, the political economist, is the most influential Liberal journal in Scotland, and is believed to have a circulation of 56,000, larger than that of any daily paper out of London. The earliest Scottish provincial newspaper was the "Glasgow Courant," established

in 1715. The "Aberdeen Journal" was founded in 1746 by Mr James Chalmers; the first number contained an account of the battle of Culloden. The number of newspapers published in Scotland in 1843 was 69; it is now 164, 15 of that number belonging to Edinburgh. A few of the leading newspapers of Scotland contain articles little inferior in talent to those of the best English newspapers, and exercise considerable political influence, at least in matters relating to Scotland. About a score of the Scottish papers are regarded as Conservative, 60-70 Liberal, and the rest Independent or neutral in politics. Edinburgh has in all 12 newspapers, including the weekly issues of the 4 dailies; Glasgow 17 (with 6 dailies); Aberdeen 3 in all; Dundee 4; Paisley 3. The price of most of the daily papers is 1d.; of some it is 2d.; that of the weeklies and bi-weeklies varies from 5d. to 4d.

In Ireland, a news-sheet, called "Warranted Tidings from Ireland," was printed during the rebellion of 1641; but the first Irish newspaper, properly so called, was the "Dublin Newsletter," commenced in 1665. "Poe's Occurrences," a Dublin daily paper, originated in 1700, was continued for half a century. It was followed, in 1728, by another daily paper, "Faulkner's Journal," established by George Faulkner, "a man celebrated for the goodness of his heart, and the weakness of his head." The oldest existing Dublin newspapers are "Saunders' (originally Redahe's) Newsletter," begun in 1746, and the "Evening Post," instituted in 1725. The "Limerick Chronicle," the oldest Irish provincial paper, dates from 1766. Ireland possessed 79 newspapers in 1843, and had in 1877 about 150. Most of them are characterised by an enmity of language, and a strength of political bias, unknown in the other parts of the United Kingdom. The "Irish Times" and the "Evening Mail," published in Dublin, and the "Belfast News Letter," are influential daily papers.

The Isle of Man supports 1 Conservative, 2 Liberal, and 1 neutral journal. Jersey has 9 journals, 4 printed in French and 5 in English; 4 are Liberal, 1 Conservative, 2 Liberal-Conservative, 1 Independent, and 1 neutral. Guernsey has an official gazette printed in French, which is Protestant and neutral, besides 2 Liberal, 1 Liberal-Conservative, and 2 neutral papers. These local papers are conducted with a great amount of spirit and success.

In the British colonies, newspapers are numerous, including those in India, printed in the Bengalee and other native languages. "Hickling's Gazette," the first Anglo-Indian newspaper, appeared at Calcutta in 1781; it was followed, in 1784, by a small official sheet, the "Calcutta Gazette, or Oriental Advertiser." The still surviving "Bengal Hurkurn" was established in 1793. In the earlier times of Indian newspapers, though there was no direct censorship, exemplary punishment was often inflicted on the authors of offensive paragraphs. In 1794, Mr Duncane, editor of the "World," was transported to Europe for an inflammatory address to the army which appeared in his paper; and a similar result followed, in 1798, to another editor, who made some severe observations on the official conduct of a local magistrate. A censorship, established by Lord Wellesley in 1799, was abolished by the Marquis of Hastings in 1818; but a licence, revocable at pleasure, was required to be taken out by every printer of a newspaper. In 1832, the Indian press consisted of 6 European and 5 native journals. The licensing system was done away with by Lord Metcalfe's law of 1835, a step disapproved of by the East India directors. This law remained in force till the sepoy mutiny, since which event there has been a return to the system of licences. In 1875, there were in India 135 Eng., 270 vernacular, and 55 mixed Eng. and vernacular newspapers.—The first Australian paper was the "Sydney Gazette," founded in 1803 by George Howe, a Creole of St Kitts. Hobart Town had its journal in 1804, and in 1824 newspapers began to multiply in the Australian colonies. The principal are now the "Sydney Herald," the "Sydney Mail," the "Argus" of Melbourne, and the "South Australian Register." The materials for printing this last-named paper were carried out by the original South Australian colonists, the first number having been previously printed in England. A similar course was adopted by the first New Zealand colony in 1839 in founding their "New Zealand Gazette" and "New Zealand Advertiser." Tahiti has, since 1844, had its "L'Océan Français." There is also the "Fiji Times," the "Fiji Gazette," and the "Central Poly-nesian."

*France.*—The earliest French newspaper is said to have been established by Théophraste Renaudot, a physician, in the beginning of the 17th century. The first number of his "Gazette" appeared in 1631. In the following year, through interest

of Cardinal Richelieu, he obtained a royal privilege for his "Gazette;" it was continued weekly up to 1762, and then began to appear twice in the week, and to combine advertisements with public news. Commercial intelligence was added in 1765, and in 1792, theatrical announcements. In 1650 was started the "Gazette Burlesque," a journal in verse, edited by the poet Jean Loret, devoted in a great measure to the *chronique scandaleuse* of Paris; and in 1672, the "Mercure Galant," a political and literary journal, which afterwards became the "Mercure de France," and was continued during the Revolution, and down to 1815. The first French daily newspaper was the "Journal de Paris," which began in 1777, and was discontinued in 1819. A large crop of journals sprang into being with the Revolution, organs respectively of Republicans, Jacobins, and Royalists, but most of them had a very brief existence. Under the first Napoleon the freedom of the press was much restricted. By one of his earliest ordinances as First Consul, all the newspapers were suppressed except 18, and under the Empire the tolerated journals were allowed to be little more than echoes of the official "Moniteur." From the danger which attended the handling of political questions, arose the practice of filling a large portion of the sheet with the "Feuilleton," consisting of a sketch or tale by a popular writer, which has ever since been a characteristic of French journalism. During the Restoration period, the press being again less fettered, there was a large increase in the number of newspapers. In 1826 there were 127, and in 1829, 307 newspapers published in Paris. The July Revolution at first added still further to their number; but the restrictive measures of 1834, consisting in the imposition of a stamp duty, and of an obligation to find security to the amount of 24,000 francs, led to the collapse of a large proportion of the then existing journals. The "Moniteur," "Débats," and "Presse" were in possession of the government, and for a time also the "Constitutionnel," and every shade of political opinion had its recognised organ. Emile de Girardin's scheme of widening the circulation of the government organ, the "Presse," by bringing down the subscription price from 80 to 40 francs, had the result of reducing the price of the opposition journals also. Cheap newspapers being thus established, it soon appeared that with the class among whom they circulated most widely the feuilleton was regarded of more importance than the political article, and it thus became the policy of the journalists to pay enormous sums to the cleverest novelists of the day, in order to retain them in their service. 100,000 francs paid by Dr Véron of the "Constitutionnel" to Eugène Sue for his "Juli Errant," turned out as profitable a speculation for the journalist as for the novelist.

The Revolution of 1848, like the revolutions that had gone before it, gave birth to a multitude of short-lived journals. There were 89 different political journals started into ephemeral existence in Paris during the late Commune, from March 19 to the 27th of May, 1871. When the late Emperor Napoleon was president of the republic, a law was passed obliging the author of every newspaper article to affix his name to it. In February 1852, the press laws were incorporated, with increased stringency, into a *Décret organique sur la Presse*. Louis Napoleon, during the empire, relaxed the stringency a little. The republic holds newspapers in as great bondage as did its imperial predecessor. Among the most important daily papers published in Paris are the "République Française," "Pays," "Siècle," "Presse," "Débats," "Bien Public," "France," "Journal Officiel," "Charivari," and "Figaro."

*Belgium.*—In the Low Countries an illustrated war gazette, called the "Nieuweti-jdinghe," was first published in 1605; it was the precursor of the "Gazette van Antwerpen," which survived till 1805. During the Spanish and Austrian rule, each town had its privileged newspaper, but the press was considerably fettered in the expression of political opinion. Under the French rule, most of these journals disappeared or sunk into insignificance. The "Annales Politiques" was a political journal of considerable popularity during last century. Since the Revolution of 1830, the press has been subject to few restraints, the newspapers have been numerous, and some few of them well conducted. The "Indépendance Belge" has a large circulation, and exercises considerable political influence. It is the property of a company of bankers, and is conducted by a Frenchman of talent and liberal sentiments. The "Moniteur Belge" was instituted as the official organ of the ministry in 1830. "Le Nord," a Russian org<sup>n</sup> published in Brussels, is conducted with

great ability. A large circulation is enjoyed by the "*Journal de Bruxelles*," the "*Émancipation*," and the "*Etoile Belge*"—all papers in the interest of the *parti prêtre*, and supplied with correspondence from Rome. The "*Écho de Bruxelles*" and the "*Journal de Belgique*" are independent papers. The "*Précurseur d'Anvers*," and the "*Escant*" of Antwerp, have a good circulation—the latter is at once ultramontane and ultra-democratic.

*Holland*.—The earlier newspapers of Holland were in some respects, particularly in the accuracy of their information, in advance of those of other countries, but gave far more prominence to commercial than to political intelligence. They all bore the name of "*Courant*" appended to the name of the town where they were published. Though subject to no censorship since 1818, it was not till 1830 that they began to comment on political occurrences. At present the principal Dutch journals are the "*Allgemeene Handelsblad*" of Amsterdam, and "*Amsterdam Courant*;" the "*Harlemsche Courant*;" and the "*Journal de la Haye*," "*De Nederlandsche Stoompost*," and "*Staats Courant*"—published at the Hague.

*Switzerland*.—Switzerland being a confederation of states, each with its own institutions, the Swiss newspapers have a very local character; but they are numerous, and some of them have of late years greatly improved in character. The "*Swiss Times*," published in Geneva, and printed in both French and English, is now frequently quoted in all countries.

*Germany*.—Though in Germany the "*Relationen*" above alluded to, were in some sort the precursors of newspapers, yet no serial newspaper, properly so called, seems to have existed till 1615. Frankfurt was the first town that possessed its journal; next followed Fulda, Hildesheim, and Herford. The earliest Leipzig newspaper was instituted in 1660. The first newspaper with a staff of foreign correspondents was the "*Hamburgische Correspondent*," but no German newspaper can be said to have had any political weight till the institution of the "*Allgemeine Zeitung*," founded by Cotta in 1798, now published at Augsburg, which still takes rank as the first paper in Germany. During French ascendancy, the German papers were little more than echoes of the Parisian; but a number of journals of a more national character sprung up during the war of liberation. The abuse of the liberty of the press after 1830, led to the imposition by the diet of restrictions of a somewhat severe character on newspapers. Although within the last twenty years there has been a decided improvement in the literary and political character of the German newspapers, the Socialist Law of 1878 is a severe restriction of the liberty of the press. Among the principal Berlin daily papers are the "*Vossische Zeitung*," the "*Norddeutsche Allgemeine Zeitung*" (semi-official), the "*Neue Preussische Zeitung*" (usually known as the "*Krenz Zeitung*," "*Post*," "*National-Zeitung*," and "*Volks-zeitung*." The "*Allgemeine Zeitung*," published at Augsburg, is a very influential and well-conducted journal.

*Austria*.—The Austrian newspapers have partaken of the advance in the newspaper press of Germany. The most important of them is the "*Wiener Zeitung*," with its evening reprint, the "*Wiener Abendpost*," not insignificant either in a literary or political point of view, and the "*Neue Freie Presse*."

*Italy*.—We have mentioned the early "*Notizie Scritte*," or gazettes of Venice. The news-sheets which followed them were in disfavor with the see of Rome; and a memorable bull denouncing them was issued by Gregory XIII. Up to 1847, the newspapers of Italy were small, politically insignificant, and subject to a strict censorship. With the accession of Pope Pius IX., a flood of political journals made their appearance, one or two of which only were conducted with any approach to talent, and few lasted above a year. In the Sardinian dominions there continued to be no fewer than 45 political papers published in 1852, 41 of which were printed in Italian and 4 in French. Of that number a great many soon afterwards collapsed. The removal of the former restrictions of the press in other parts of the Kingdom of Italy has started into life a number of newspapers. Seventeen political and ten partially political papers are now published in the dominions of Victor Emmanuel, besides 31 periodicals, many of which answer more or less to our ideas of a newspaper. Few of these newspapers are as yet of much promise. The leaders are poor, no great social or commercial questions are discussed, and each journal is the mere advocate of one or other of the political parties. Perhaps the best of them, on the whole, are "*Il Diritto*" and "*L'Oplione*," which may be compared to

some of the second-rate French papers. The "*Gazetta Ufficiale del Regno d'Italia*" is the ministerial organ, and "*L'Italie*," published in France, is looked upon as the organ of the department of Foreign Affairs. Humorous newspapers, after the model of our "*Punch*," are abundant. The "*Voce della Verità*" is the paper which advocates the cause of the pope. "*La Liberta*" and "*Il Fanfulla*" are published in Rome; Genoa issues its "*Corriere Mercantile*;" Milan, "*La Perseveranza*," and Naples, the "*Pungolo*" and "*Patrin*."

**Spain.**—Sheets called "*Relaciones*," giving accounts of important occurrences, used to appear in Spain at irregular intervals in the 17th c., occasionally in the form of romances; but no Spanish newspaper, properly so called, existed till last century, and fifty years ago Madrid possessed but one journal. The first approach to political journalism followed in the wake of the Peninsular War and the establishment of the Cortes. The gross licence with which many of the then established papers were conducted, led in 1824, to the suppression of all except the "*Diario*" and "*Gaceta*" of Madrid, the "*Gaceta de Bayona*," and a few which were purely commercial or scientific. At present, about 40 journals are published in Madrid, politically and in every other respect very unimportant; the most read is the "*España*." The press of Portugal is as insignificant as that of Spain: the official organ is the "*Diário do Governo*."

**Sweden and Norway.** The earliest Swedish newspaper seems to have been the "*Ordinarie Post Tidende*," established in 1643, and continued till 1680. It was followed by the "*Relationes Curiosæ*" in Latin (1682—1701). Two French papers, the "*Gazette Française de Stockholm*" and the "*Mercure de Suède*," existed in Sweden in the second half of last century, but politically the newspaper press cannot be said to have had any influence until the establishment of the "*Argus*" by Johansson in 1800. For a number of years the principal journals of Sweden were the "*Fäderneslandet*," the organ of the royalists, and the "*Aftonbladet*," that of the reformers. The latter, on King Oscar's accession, ceased to be an opposition journal. The official paper is the "*Post och Lärkes Tidningar*." Every provincial town has now its journal, and there are about 114 newspapers in all published in Sweden. Of the Norwegian papers, the oldest is the "*Christiania Intelligentsedler*," founded in 1763. "*Den Constitutionelle*" is the government journal, and "*Den Morgenblad*" the organ of the opposition.

**Denmark.**—In Denmark journalism is still more recent. Up to 1830 only two newspapers were published in Copenhagen, both entirely made up of extracts from foreign journals. Since 1834, there has been an improvement in the character and increase in the number of the Danish journals. They numbered 36 in 1849. The oldest newspaper now existing in Denmark is the semi-ministerial "*Berlingske Tidende*," founded in 1749. The "*Fædrelandet*" is the journal of the Scandinavian popular party.

**Russia.**—The earliest newspapers in Russia were published under the personal surveillance of Peter the Great, first in Moscow and afterwards in Petersburg, to report the progress of the war with Sweden. Political journalism, properly so called, has, however, never flourished in Russia, and has, in fact, only been allowed in important political crises—as the French invasion of 1812, the Polish insurrection of 1830, and recently during the Crimean War, when the journalists were allowed to exercise their ingenuity in defending the government policy. The largest circulation was at that time attained by the "*Sjéwernaja Ptsch'eta*," or "*Northern Bee*," which had its feuilleton. Generally speaking, the Russian newspapers occupy themselves with scientific and literary subjects rather than public or political news. The "*Journal de St Petersburg*," in French, is the organ of the court, and has considerable circulation out of Russia.

**Turkey.**—The first newspaper in Turkey was founded, in 1796, by M. Vermihac, envoy-extraordinary of the French government to the court of Selim III., and printed in French at Pera. A Frenchman of the name of Blacque established at Smyrna, in 1826, the "*Spectateur de L'Orient*," afterwards the "*Courrier de Smyrne*," which had considerable political influence during the Greek war. The same M. Blacque afterwards edited the official journal of the Porte, called the "*Moniteur Ottoman*," which has, since 1832, been reprinted in Turkish under the name of the "*Taqlimi Vaqâf*." The "*Taqlimi*" was till lately a very badly printed sheet, but it has much improved, and now issues weekly instead of monthly, some-



times containing very fair literary and political articles. But the most important Turkish paper is the "*Djeridei Havadis*," founded in 1843 by Mr Alfred Churchill, an Englishman born in Turkey. It embraces a great variety of matter, a court gazette, official appointments, home and foreign news, advertisements, prices of stocks, and a feuilleton. There are besides in Constantinople two new and popular papers, called the "*Terguman Ahwal*," or "*Interpreter of Events*," published three times a week, and the "*Tas veeri Evkâr*," or "*Mirror of Thoughts*," published twice a week. The latter has a scientific and literary reputation. The Turkish papers have no leading articles, and from the constitution of political society in Turkey, there can be no avowed opposition to the policy of the government. The "*Courrier de Constantinople*," in French, is one of the principal journals of the capital; here appear also the "*Levant Herald*" and the "*Levant Times*" in English. And papers in French, Italian, Greek, and Armenian are published in various parts of the empire.

*Greece*.—Various newspapers in modern Greece appeared at Paris and Vienna before Greece obtained her independence; but the first political journal published in Greece was the "*Helléniké Salpigx*," founded in 1824, and soon followed by the "*Hellénika Chronika*" and "*Hellénikos Tēlegraphos*" in Missolonghi, the "*Philos ton nomou*" at Hydra, the "*Ephēmerides Athenaike*" at Athens, and the official "*Genikē ephēmeristēs Hellados*" published at Nauplia, with its opponent the "*Apollōn*," which afterwards became the "*Athēna*." Most of these papers disappeared in 1833 on the system of sureties being introduced. The "*86ter*" was established as the government organ in 1833. Upwards of eighty newspapers are now published in Greece, the largest number of them in Athens. Of these several appear in French, Italian, and English. The leading political journal of Athens is the semi-monthly "*Spectateur d'Orient*," but generally speaking, the Greek papers make no endeavor to lead the parties in the state.

*United States*.—In America, the earliest newspaper was the "*Boston Newsletter*," founded in 1704, insignificant in size and contents, and conducted by John Campbell, the postmaster of the town. A rival to it appeared, in 1719, in the "*Boston Gazette*," "published by authority." The "*Boston Newsletter*," however, thrived in spite of opposition. With the name changed to the "*Massachusetts Gazette and Boston Newsletter*," it was the support of the British rule against the desire for independence, and ceased to appear when the British troops evacuated Boston. The "*New England Courant*," established in 1721, was at first printed by James Franklin, and afterwards edited by his brother the famous statesman. It lasted but six years, but a subsequent newspaper, entitled the "*Pennsylvania Gazette*," was started by Benjamin Franklin in 1729, and continued weekly till 1745, when it merged in the "*North American*." "*Ede's Boston Gazette*," begun in 1765, was for a long time the chief organ of the popular party; in it appeared John Adams's "*Letters of Novanglia*." The "*Massachusetts Spy*" was another paper of note on the revolutionary side. It was afterwards removed from Boston to Worcester, and still appears as the "*Worcester Spy*." At the revolution, the New England colonies possessed 14 newspapers; Pennsylvania, 9; New York, 4; and the middle and southern colonies, 10. All save the semi-weekly "*Advertiser*" of Philadelphia were published weekly. The development of the newspaper trade has kept pace with the advancing prosperity of the country. In 1803, the number of newspapers had increased to 200, of which several were daily papers. In 1810, there were 359, including 27 daily sheets. In 1823, 552 papers appeared; in 1850, no less than 2526; while in 1870 there were 5871 newspapers, with a circulation of 20,842,475, and a yearly issue of 1,508,350. In 1874, the number of weekly papers had reached 5544, besides the weekly issues of 678 daily papers. Some of the New York weeklies have an enormous circulation, the "*Ledger*" having occasionally sent out upwards of 400,000 copies. The Germans publish 310 papers in their own tongue; the Scandinavians, 19; Spaniards, 16; Italians, 2; Welsh, 4; Bohemians, 5; Poles, 2; Portuguese, 1; while there is a Chinese newspaper published at San Francisco, and a Cherokee one at Tahlequah in the Indian Territory. About 275 periodicals, with a supported aggregate circulation of 65,000,000 copies, are issued in the United States. Among the leading newspapers of New York, the order of importance, both as to enterprise and circulation, is the "*New York Herald*," the "*Tribune*," and the "*New York Times*."

The principal religious papers published in New York are the "Observer and Evangelist," organs of the Presbyterians; "Independent and Christian Union," of the Congregationalist; the "Churchman" is Episcopal; the "Christian Advocate," Methodist; and the "Examiner," Baptist. The Unitarians are represented by the "Liberal Christian;" the Catholics by the "Tablet;" and the Swedenborgians and Jews have also their papers.

All the other numerous journals of the American States, are, compared with those of New York, accounted provincial, but many are, nevertheless, vigorously conducted. Each county, comprising, on an average, 360 square miles, has generally two or three papers—one being republican, another democratic, and if there is a third, it is probably the organ of some religious or other sect. The printer is, in most cases, the editor, and the village lawyer supplies leaders seasoned frequently with personal attacks. Some of them have been successfully started with no larger capital than £100 of borrowed money.

There is an immense collection of newspapers in the British Museum, which belonged in part to the library of Sir Hans Sloane, in part to that of Dr Charles Burney. See Andrews's "History of British Journalism" (London, 1859). Grant's "The Newspaper Press; its Origin, Progress, and Present Condition" (London, 1871).

NEWT, or Eft (*Triton*), a genus of batrachians of the family *Salamandridæ*, more aquatic in their habits than the salamander, to which, in form and characters, they are very similar, having an elongated body and tail, and four small weak limbs. The tail is vertically compressed, and a crest is often developed on the back and tail, but the crest is characteristic of the males in the breeding season, and the tail becomes rounded when the animals leave the water, as they often do, particularly in the latter part of summer or in autumn; which, along with other variations apparently dependent on circumstances, have caused no little multiplication of specific names. The most abundant British species is the COMMON N., or SMOOTH N. (*P. punctatus*, *Liasotriton punctatus*, or *Lophinus punctatus*), which is from 3½ to 4 inches long, brownish gray above, yellowish beneath, spotted with black, with a soft, smooth skin, and two bands of pores on the head; a well-known inhabitant of stagnant pools and ditches, often found also under stones and in other damp situations. The WARTY N. (*T. palustris*, or *cristatus*), also pretty common, is 5 or 6 inches in length, blackish brown above with round spots of a darker tint, bright orange or orange-yellow with black spots on the under parts, the sides dotted with white, and the tail often exhibiting a white band, the skin rough or warty, and with many pores. The dorsal and caudal crests of the Warty N. are separate; those of the Common N. are united. Many other species occur in other parts of the world. They all feed on animal food, of which tadpoles and aquatic insects form the chief portions. They deposit their eggs on the leaves of aquatic plants, each egg separately, twisting or folding the leaf with their feet so as to conceal the egg, which is surrounded by a viscous substance, so that the leaf is retained in this form. The transformations of newts are noticed in the article BATRACHIA. They very frequently change their skin. They possess, in an extraordinary degree, the power of reproducing lost members—a limb, a tail, even an eye—in every respect perfect. Spallanzani, who made many observations on this subject, found that the same member could be reproduced a number of times successively. Newts are also capable of surviving, although long frozen up in ice, and return to activity when a thaw takes place. A strong and almost universal popular prejudice exists against them as most noxious animals, although they are not in the slightest degree venomous. They have recently, however, begun to be more favorably regarded in consequence of the frequency of aquaria, of which they are interesting inmates.—It is a curious fact that Linnaeus, contrary to his usual discriminating penetration, confounded newts with lizards, which they resemble merely in form, differing widely in the most important characters. That they are often confounded by the unscientific is not wonderful.

NEWTON, Sir Isaac, the most remarkable mathematician and natural philosopher of his own or perhaps of any other age, was born at Woolsthorpe, in Lincolnshire, in the year 1642. That year, remarkable in English history for the breaking out of the civil war between Charles I. and the parliament, is doubly remarkable in the

history of science by the birth of N. and the death of Galileo. The circumstances with which the pursuit of truth, in scientific matters, was at this time surrounded in the respective countries of these great philosophers, were not more different than the characters of the philosophers themselves. Galileo died a prisoner, under the surveillance of the Inquisition, "for thinking, in astronomy," as Milton says, "otherwise than the Franciscan and Dominican sycophants thought." In England, it had become the practice, and soon became the fashion, through the influence of Bacon and Descartes, to discard altogether the dictates of *authority* in matters of science. The dispositions of the two philosophers were happily suited to the situations in which they thus found themselves. Galileo's was a mind whose strength and determination grew by the opposition it encountered. The disposition of N., on the other hand, diffident of the value and interest of his own labors, and shrinking from the encounter of even scientific controversy, might have allowed his most remarkable discoveries to remain in obscurity, had it not been for the constant and urgent solicitation of his friends that they should be published to the world.

N. received his early education at the grammar school of Grantham, in the neighborhood of his home, at Woolsthorpe. On the 5th of June 1661, he left home for Cambridge, where he was admitted as sizar at Trinity College. On the 8th of July following, he matriculated as sizar of the same college. He immediately applied himself to the mathematical studies of the place, and within a very few years must have not only made himself master of most of the works of any value on such subjects then existing, but had also begun to make some progress in the methods for extending the science. In the year 1665, he committed to writing his first discovery on fluxions; and it is said that in the same year, the fall of an apple, as he sat in his garden at Woolsthorpe, suggested the most magnificent of his subsequent discoveries—the law of universal gravitation. On his first attempt, however, by means of the law so suggested to his mind, to explain the lunar and planetary motions, he employed an estimate then in use of the radius of the earth, which was so erroneous as to produce a discrepancy between the real force of gravity and that required by theory to explain the motions, corresponding to the respective figures 16.1 and 15.2. He accordingly abandoned the hypothesis for other studies. These other pursuits to which he thus betook himself consisted chiefly of investigation into the nature of light, and the construction of telescopes. By a variety of ingenious and interesting experiments upon sunlight refracted through a prism in a darkened apartment, he was led to the conclusion that rays of light which differ in color, differ also in refrangibility. This discovery enabled him to explain an imperfection of the telescope, which had not till then been accounted for. The indistinctness of the image formed by the object-glass was not necessarily due to any imperfection of its form, but to the fact of the different colored rays of light being brought to a focus at different distances. He concluded rightly that it was impossible for an object-glass consisting of a single lens to produce a distinct image. He went further, and too hastily concluding from a single experiment, that the dispersive power of different substances was proportional to their refractive power, he pronounced it impossible to produce a perfect image by a combination of lenses. This conclusion—since proved erroneous by the discovery of the achromatic telescope by Mr Chester More Hall, of More Hall, in Essex, about 1729, and afterwards, independently, by Mr Dollond in 1751—turned N.'s attention to the construction of reflecting telescopes; and the form devised by him is the one which, at later periods, reached such perfection in the hands of Sir William Herschel and Lord Rosse.

It was on the 11th January 1671 that N. was elected a member of the Royal Society, having become known to that body from his reflecting telescopes. At what period he resumed his calculations about gravitation, employing the more correct measure of the earth obtained by Picard in 1670, does not clearly appear; but it was in the year 1684 that it became known to Halley that he was in possession of the whole theory and its demonstration. It was on the urgent solicitation of Halley that he was induced to commit to a systematic treatise these principles and their demonstrations. The principal results of his discoveries were set down in a treatise called "*De Motu Corporum*," and were afterwards more completely unfolded in the great work entitled "*Philosophiæ Naturalis Principia Mathematica*," which was finally published about midsummer 1687.

Shortly before the "Principia" was given to the public, N. had been called to take an active part in defending the rights of the university against the illegal encroachments of James II. The conspicuous part which he had taken on that occasion procured him a seat in the Convention Parliament, in which he sat from January 1690 to its dissolution in 1690. In 1696, he was appointed Warden of the Mint, and was afterwards promoted to the office of Master of the Mint in 1699, an office which he held till the end of his life. He again took a seat in parliament, in the year 1701, as the representative of his university. Thus engaged in the public service, he had little time left for mere scientific studies—pursuits which he always held of secondary importance to the public duties in which he was engaged. In the interval of public duty, however, N. shewed that he still retained the scientific power by which his great discoveries had been made. This was shewn in his solution of two celebrated problems proposed, in June 1694, by John Bernoulli, as a challenge to the mathematicians of Europe. A similar mathematical feat is recorded of him so late as 1716, in solving a problem proposed by Leibnitz, for the purpose, as he expressed it, of feeling the pulse of the English analysts. When in parliament, N. recommended the public encouragement of the invention of a method for determining the longitude—the first reward in consequence being gained by John Harrison for his chronometer. He was President of the Royal society from 1703 till his death, a period of twenty-five years, being each year re-elected. In this position, and enjoying the confidence of Prince George of Denmark, he had much in his power towards the advancement of science; and one of his most important works during this time was the superintendence of the publication of Flamsteed's "Greenwich Observations"—a task, however, not accomplished without much controversy and some bitterness between himself and that astronomer. The controversy between N. and Leibnitz, as to priority of discovery of the differential calculus, or the method of fluxions, was raised rather through the partisanship of jealous friends, than through the anxiety of the philosophers themselves, who were, however, induced to enter into and carry on the dispute with some degree of bitterness and mutual recrimination. The verdict of the impartial historian of science must be, that the methods were invented quite independently, and that, although N. was the first inventor, a greater debt is owing by later analysts to Leibnitz, on account of the superior facility and completeness of his method. The details of these controversies, with all other information of the life of this philosopher, will be found admirably collected in the "Life" by Sir D. Brewster, who writes with not only an intimate acquaintance with N.'s works, but in the possession of all the materials collected in the hands of his family. N. died on 20th March 1727, and his remains received a resting-place in Westminster Abbey, where a monument was erected to his memory in 1731. A magnificent full-length statue of the philosopher, executed by Ronbilliac, was erected in 1755 in the antechapel of Trinity College, Cambridge. This work was assisted by a cast of the face taken after death, which is preserved in the university library at Cambridge. In 1699, N. had been elected a foreign associate of the Academy of Sciences, and in 1703, he received the honor of knighthood from Queen Anne. Among the best editions of N.'s principal works are the quarto edition of the "Optics" (Lond. 1704), and the quarto edition of the "Principia," published at Cambridge in 1713.

NEWTON, Thomas, an English prelate of the 18th c., was born at Lichfield, January 1, 1704. He was educated at Westminster School, and afterwards at Trinity College, Cambridge, where he took the degree of M.A. in 1730, in which year also he was ordained priest. After holding several minor preferments, he was made Bishop of Bristol in 1761, and died 14th of February 1782. Without any remarkable merit, N. has, one cannot well say how, succeeded in obtaining a place in literary history. His two productions, whose fortunes have surpassed their deserts, are an edition of "Milton's Paradise Lost" (2 vols. 1749), with a memoir of the poet, and critical and explanatory notes; and "Dissertations on the Prophecies" (3 vols. 1754—1755). Besides these, he wrote occasional sermons, and a host of scriptural dissertations, the theology of which is reckoned not always "orthodox."

NEWTON, a township in Massachusetts, United States of America, on Charles River, eight miles west of Boston. It contains two villages, Upper Falls and Lower Falls, with 3 paper-mills, 3 cotton and hosiery factories, a Baptist theological seminary, and 19 churches. Pop. (1870) 12,852; 1880, 16,995.

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**NEWTON-ABBOT**, a market town of England, in the county of Devon, beautifully situated in a vale on the river Lemon, 15 miles south-south-west of Exeter. The portion of the town called Newton-Bushel is on the left side of the stream. It has been undergoing considerable improvements within recent years. William of Orange, after landing at Torbay, in 1688, made his first public declaration here. Pop. (1871) 6092.

**NEWTON-IN-MARKERFIELD**, a thriving manufacturing and market town of England, in Lancashire, 15 miles west of Manchester, on the Manchester and Liverpool Railway. Two large iron foundries, as well as printing, paper and sugar works, an oil-distillery, and a brick, tile and pot manufactory are in full operation. There is a beautiful lake in the town called Newton Mere, which is covered during the summer months with the pleasure-boats of the townspeople. Horse-races are held here in June, and horse and cattle fairs in May and August annually. The election of M.P.'s for South Lancashire takes place in Newton. Cotton and flour mills, iron foundries and glass-works are in operation; and bricks are made. Pop. (1871) 8244.

**NEWTON-UPON-AYR**, a burgh of barony and parish of Scotland, in the county of Ayr, on the north side of the river Ayr, and united with the town of that name by three bridges. See **AYR**. Its population is included in that of Ayr. N. has ship-building docks, roperies, and iron and brass foundries. It exports 100,000 tons of coal annually.

**NEWTON'S RINGS**. In his investigations of the colors produced by thin plates of any material, solid, fluid, or gaseous, Sir Isaac Newton hit upon the following mode of exhibiting the colors produced by a film of air. He took two lenses, one convexo-plane, its convex side having a radius of 14 feet, the other equi-convex, with the radii of its surfaces 50 feet, and laid the first with its plane surface downwards on the top of the second, thus producing a thin film of air between the lenses; the film being thinnest near the centre, and becoming gradually thicker outwards. On slowly pressing the upper lens against the under one, a number of concentric colored rings, having the point of contact of the lenses for their centre, appeared, and increased in size when the pressure was increased. These rings, or more properly systems of rings, are seven in number, and each of them is composed of a number (ranging from eight in the first or smallest ring, to two in the outermost) of rings of different colors, the colors, though different in each of the systems of rings, preserving the same arrangement as the colors of the spectrum, of which they seem to be modifications; thus, in the second ring the inside color is violet, and the outside scarlet red. The colors are very distinct in the first three systems of rings, but become gradually confused and dull towards the outside, till they almost fade away in the seventh system. The centre is deep black. The thickness of the air-film at the centre is about half a millionth of an inch, and increases gradually to nearly 1-130,000 of an inch, when the colors disappear.

**NEWTOWN**, a modern manufacturing town of North Wales, in the county of Montgomery, 8 miles south-west of the town of that name, on the right bank of the Severn, and on the Montgomery Canal, which connects it with the inland navigation of the country. It is the centre of the flannel manufactures of the county. It has 40 factories, employing in all 960 men. Pop. (1871) 5744.

**NEWTOWNARDS**, a market-town of the county Down, Ireland, 19 miles east from Belfast by railway. Pop. (1871) 9562. It contains a court-house, a town-hall, and a market-square; a Protestant church, a Roman Catholic chapel, seven Presbyterian meeting-houses, numerous schools, and a union workhouse. It is a neat and well-built town, of considerable trade, and with extensive muslin, flax-spinning, and weaving factories. Since the Union, it has ceased to be a parliamentary borough. The affairs of the town are administered by commissioners.

**NEWTOWN-LIMAVADY** (Ir. *Leim-a-madha*, "The Dog's Leap"), a market-town of the county of Londonderry, Ireland, and 16 miles east-north-east of the town of Londonderry. Pop. in 1871, 2762. N.-L., in the period anterior to the establishment of English rule, was the seat of the powerful sept of the O'Canans, or O'Kanes; and during the wars of the Revolution it was the scene of more than one struggle between the followers of James II. and those of William. Its chief importance at

present is as a centre of the flax trade, once the staple of that district, and again rising in importance. It possesses a town-hall, weaving factory, extensive flour-mills, markets, and brewery; union workhouse, Protestant church and other places of worship, and two comfortable hotels.

**NEXT FRIEND** is, in English Law, the name given to the person in whose name, or rather by whose agency, an infant—i. e., a person under the age of 21—sues in the courts of law and equity. The object is chiefly to have some party responsible for costs in case the infant fails in the action. In practice, the father, if alive, is usually the next friend, but any substantial person may be so. In the Court of Chancery, a married woman sues or appears by the intervention of a next friend, where she is personally interested.

**NEY, Michel**, a celebrated marshal of the first French empire, was the son of a cooper, and was born at Saarlonis, 10th January 1769. He was a non-commissioned officer in a hussar regiment when the Revolution began, and afterwards rapidly rose to high military rank. For the capture of Mannheim by a *coup de main*, he was made a general of division in 1799. He was interim commander of the army of the Rhine for a short time, during which he frustrated by a bold diversion an important movement of the Archduke Charles against Massena and the army of Switzerland. After the peace of Lunéville, Bonaparte, anxious to win N., with other republicans, to his party, brought about his marriage with a young friend of Hortense Beauharnais, and appointed him inspector-general of cavalry. On the establishment of the empire, he was made a marshal. In 1805, he stormed the intrenchments of Elchingen, and was created Duke of Elchingen. He afterwards rendered important services in the Tyrol; contributed much to the French successes of 1806 and 1807; and served in Spain with great ability in 1808 and 1809, till he was dismissed by Massena, the commander-in-chief, on a dispute about the plan of the campaign. Chagrined by this, and dissatisfied with Napoleon's despotism, he remained for some time inactive; but in 1812 received the command of the third *corps d'armée*, and greatly distinguished himself at Smolensk and the Moskwa, in consequence of which he was created Prince of the Moskwa. He also displayed great abilities in the French retreat. He had a principal part in the campaigns of 1813 and 1814, but after the capture of Paris, he urged the emperor to abdicate, and submitted to Louis XVIII. who loaded him with favors. On Napoleon's return from Elba, N. assured the king of his fidelity, and was sent against Napoleon at the head of 4000 men; but finding the emperor to be received with general enthusiasm, and his own soldiers to be favorable to his cause, N. went over to his side. In the battle of Waterloo, he commanded the centre, and had five horses shot under him. After the capitulation of Paris, he yielded to the entreaties of his family to retire to Switzerland; but a costly Egyptian sabre, the gift of Napoleon, led to his being suspected by an official, and arrested. He was condemned to death for high treason, and was shot in the garden of the Luxembourg on 17th December 1815. He left three sons, who published his "*Mémoires*" (2 vols. Par. 1838).

**NGAMI, Lake**. The existence of lakes in the interior of Africa was vaguely known as far back as the days of Herodotus; and the earliest modern maps shew at least half-a-dozen large and small, one of which is about the size, and very nearly in the position of that shallow reservoir of surface drainage which was discovered, or at least first visited by a European in 1849, when Dr Livingstone and Mr Oswell, who were aware of its existence from native report, reached its shores by a circuitous route from the Cape Colony. Although since ascertained to be of little importance in the physical geography of these regions, Lake N. was at first supposed to be in some way connected with the larger inland seas of Nyassa, Victoria Nyanza, and Tanganyika. It is situated between the 20th and 21st parallels of s. lat., and between the meridians 23° 10' and 23° 30' e. long., at a height of about 2500 feet above the level of the sea, and is connected by a series of sluggish anastomosing streams with the river-system of the Zambesi; its extent as well as depth varies with the fall of rain in the country to the north of it, but its average size may be taken at 70 miles long, by a breadth of 30 and a depth varying from 8 to 23 feet. In 1858, Lake N. was reached from the west coast near Walfish Bay by the traveller Andersson, and there is now a well-beaten route for traders between these two places, and a considerable quantity of Ivory and ostrich feathers are annually collected in the neighborhood of

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the lake. The principal characteristics of the region are rivers, with very sluggish current, and often flowing in different directions to and from the lake, large salt-pans and extensive dry flats, covered with dense bush, the haunt of elephants and other large animals.

In 1855, the well-known sportsman and traveller, F. Green, ascended the River Tonka, which flows into the northwest angle of Lake N., as far north as the town of Lebebe, in 18° 11' lat., and then supposed that a communication existed with the waters of Chanene, a river of the west coast. If such is the case, it would be a curious phenomenon in physical geography, communicating, as we know Lake N. also does, with the Zambezi, a river of the east coast.

**NGAN-KING**, a large and wealthy city of China, the capital of the province of Ngau-whi. It stands on the left bank of the great river Yang-tze-Kiang, 199 miles south-west from Nankin. The surrounding country is highly cultivated, and very densely peopled. The mineral riches of the neighborhood are considerable. N. is a place of busy trade, great part of the goods intended for Nankin passing through the hands of its merchants. The trade is carried on by means of vessels on the river. Porcelain and cloth are among the principal articles of trade.

**NIA'GARA**, a river of North America, which flows from Lake Erie northwards into Lake Ontario. It is about 36 miles in length, and its descent from the level of the one lake to that of the other is about 334 feet. On issuing from Lake Erie, it is three-quarters of a mile broad; but as it flows on, it becomes several miles wide, making room for a number of islands, the largest of which, Grand Island, is 12 miles long, and from 2 to 7 broad. At the foot of Grand Island, which reaches within 1½ mile of the *Falls of N.*, the river is contracted to a breadth of 2½ miles, and grows narrower as it proceeds. By this, and by the descent in the channel, which is about 60 feet in the mile above the Falls, are produced the swift currents known as the *Rapids*, in which the river, notwithstanding its great depth, is perpetually white with foam. At the Falls, which are 22 miles from Lake Erie, the river is divided by an island containing about 75 acres, called Goat Island; but in consequence of a bend in the channel, by far the larger portion of the water is sent down by the Canadian side. On this side, therefore, is the grander cataract which has been named the *Horseshoe Fall*, but no longer bears the name appropriately, as the precipice has been worn from a curved into a somewhat angular shape. This process of wearing away goes on gradually still, a large projection on the Canadian bank, known as the Table Rock, having partly fallen off in 1863. The Horseshoe Fall is above 600 yards in breadth, and about 154 feet in height. The water is so deep that it retains its green color for some distance below the brow of the precipice; and it rushes over with such force, that it is thrown about 50 feet from the foot of the cliff. One may thus, having donned an oil-skin dress, enter two or three yards behind the curved sheet of water; but the spray is so blinding, the din so deafening, and the current of air so strong, that it requires a tolerably calm nerve and firm foot. The separation caused by Goat Island leaves a large wall of rock between the Canadian and American Falls, the latter being again divided by an islet at a short distance from Goat Island. This fall is from eight to ten feet higher than the Horseshoe, but only about 220 yards broad. A little above the Fall, the channel is divided by Bath Island, which is connected by bridges with Goat Island and the American shore. A small tower, approached from Goat Island, has been built on a rock over the brow of the Horseshoe Fall; and from this the finest view on the American side made be obtained, the Table Rock on the Canadian side giving the completest view of the entire cataract. The Falls can also be seen from below on both sides, and every facility is given for viewing them from all the best points, while magnificent hotels, Canadian and American, offer their inducements to the tourist to stay till he has received the full influence of the scenery. The river is crossed about 200 or 300 yards below the Falls, where it is 1200 yards broad. The current is lessened for about a mile, but increases again as the channel becomes narrower and the descent greater. Between three and four miles below the Falls, a stratum of rock runs across the direct course of the river, which, after forming a vast circular basin, with an impassable whirlpool, is forced away at right angles to its old channel. The celebrated wire suspension-bridge for the Great Western Railway, with a road beneath for vehicles and foot-passengers, crosses the

river  $\frac{1}{2}$  mile below the Fall; it is 800 feet long, 40 broad, and 200 feet above the surface of the water.

NIAGARA, chief town of Lincoln County, in the Canadian province of Ontario, is situated on Lake Ontario, at the mouth of the river Niagara, and is distant by water from Toronto 36 miles. Burned down in December 1813 by the American General M'Clure on his retreat, it was afterwards rebuilt, and promised to be a flourishing town; but its trade has fallen off within the last few years, and its population has decreased to about 3000.

NIARE (*Bos brachicheros*), the wild ox or buffalo of tropical Western Africa, is in size and weight about equal to the smaller breeds of British oxen, but of greater strength. The head is rather small, the muzzle black, the ears long and pointed, and fringed with beautiful silky hair, several inches long. The horns are 10 or 12 inches long, curved backwards, and sharply pointed. The animal is gracefully proportioned, having nothing of the clumsiness of the common buffalo. The body is covered with a coat of thin red hair. The tail is tufted at the extremity with black hair several inches long. Herds of these oxen were seen by Du Chaillu in the open or prairie lands to the south of the mouth of the Ogobai. They are shy and fierce; if wounded, they turn upon the hunter with terrible fury. No attempt seems yet to have been made to domesticate this animal, which is probably very capable of it, and might be found more suitable than other oxen for warm climates.

NIAS, an important island belonging to Holland, lies to the west of Sumatra, in  $6^{\circ} 18' 54''$ — $10^{\circ} 35'$  n. lat., and  $97^{\circ}$ — $98^{\circ}$  e. long., and has an area of about 1675 square miles. In 1857, when the Dutch took complete possession of the island, the population was reckoned at 170,000. There are several places where ships can anchor and take in provisions, water, &c. On the east coast is the village Nias, and on the west, Silorungang. Little islands and coral reefs lie here and there on the coast, which in some places is steep, while mountain-chains run from the south-east to the north-west. There is a greater breadth of excellent farming grounds than the population, reduced by internal wars and the exportation of slaves, can properly cultivate. They grow rice, cocoa-nuts, bananas, tobacco, sugar-canes, &c., and annually about 110,000 lbs. of pepper. Cattle and horses have been imported, and they pay great attention to the raising of pigs and fowls. Formerly, about 500 Niassers were carried away annually as slaves to Batavia and other places, and though this traffic has been in a great measure suppressed, it is still to some extent carried on.

The Niassers are of the Malay race, but fairer than the Malays usually are. They are gentle, sober, and peaceful, remarkably ingenious in handicraft, ornamenting their houses with wood-carvings, forging arms, &c. The women labor in the fields, the children weave mats, while the men look after the live-stock, and hunt the deer and wild swine. They worship a superior deity, and fear a powerful one, who punishes them if they do evil. Polygamy is permitted, but is rare. The gift to the bride's family is from 60 to 500 dollars. Divorce is not allowed, and adultery is punished by the death of both parties. Dead bodies are placed in coffins above the ground, and creepers and flowering shrubs planted, which speedily grow up and cover them. Trade is on the increase.—See "Malayan Miscellanies," vol. II.; "Het Eiland Nias, door" H. J. Doms; Crawford's "Descriptive Dictionary" (London, 1856); "Tydschrift voor Ned. Indië," 1854, 1860, &c.

NIBBY, Antonio, a Roman archaeologist of high celebrity, was born in 1792. He was one of those who, following in the footsteps of Winckelmann, made an elaborately minute investigation of the remains of antiquity their special study. The first work that made him known was his translation of Pausanias, with antiquarian and critical notes. In 1820, he was appointed Professor of Archaeology in the University of Rome. In the same year appeared his edition of Nardini's "Roma Antica;" and in 1837—1838, his learned and admirable "Aualisi Storico-topografico-antiquaria della carta de Contorni di Roma," to which was added (1838—1840) a description of the city of Rome itself. Among his other writings, may be mentioned his "Le Mura di Roma diseguate da W. Gell," and a large number of valuable treatises on the form and arrangement of the earliest Christian churches, the Circus of Caracalla, the Temple of Fortuna at Præneste, the graves of the Horatii and the Curiatii, &c. N. died 29th December 1839.



**NIBELUNGENLIED**, or "*Nibelunge Not*," as the words are written in the oldest manuscripts, is one of the most finished specimens of the genuine epic of Germany belonging to the middle ages. There exist twenty more or less perfect manuscript copies of this curious poem, the earliest of which belong to the beginning of the 13th c., from which period till the middle of the 16th c. it enjoyed the greatest popularity among Germans of all classes. Nothing certain is known of the author or authors of the work beyond the fact, that it was put into its present form by a wandering minstrel in Austria about or prior to the year 1310, which is the date of the oldest accredited manuscript. According to W. Grimm and Lachmann's critical analysis of the poem, it is in itself a compilation of pre-existing songs and rhapsodies, strung together into one whole upon a plan remarkable for its grand simplicity, although less skill is shewn in some instances in the manner in which the several parts are connected. In the more authentic manuscripts the poem consists of only twenty parts, and it is conjectured that the latter portions of the epic, which are given only in some of the texts, as that of St Gall, are the composition of later compilers. The epic cycle embraced in the N. may be more specially regarded as the fusion of the history of the mythical people, called in the poem the Nibelungen, with five leading groups of myths, in which are incorporated the adventures of some of the most universally popular personages belonging to the semi-historic myths of mediæval German folk-lore, as, for instance, the hero Siegfried with his mantle of invisibility, and the lovely Icelandic heroine Brunhilt; King Gauthier of Burgundy, and his fair sister, Kriemhilt, the wife of Siegfried; Haco of Norway, Dietrich (Theodoric the Great, king of the Ostrogoths) of Berne (Verona), and Etzel (Attila), king of the Huns. The loves and feuds, and the stormy lives and violent deaths of these national heroes and heroines, are skillfully entwined in the N., and artistically made to centre round the mythical treasure of the Nibelungen, which, after the murder of Siegfried, who had brought it from the far north, is secretly buried by his murderer Haco beneath the Rhine, where it still remains. The poem, in its rude but strict versification, tells the tale of Kriemhilt's vengeance for her husband's death with a passionate earnestness that carries the sympathies of the reader with it, until the interest culminates in the catastrophe of the fierce battle between the Burgundians and Huns at the court of Etzel, whose hand Kriemhilt has accepted, the better to accomplish her purposes of revenge. The tale of horrors fitly closes with the murder of Kriemhilt herself, after she has satisfied her vengeance by slaying with Siegfried's sword his murderer Haco. This tale, which seemed to echo back the clash of arms and strife of passion which characterised the early periods of German history, kept a firm hold on the imaginations of the people till the taste for polemic writings fostered, if not created at the period of the Reformation, caused this as well as many other treasures of folk-lore to be almost lost sight of and forgotten. Attention was, however, again drawn to it in the 18th c., by the publication of detached portions of the poem by Bodmer, "*Chriemhildens Rache*" (Zurich, 1751), and by Müller in his "*Sammlung deutscher Gedichte aus dem 12—14 Jahrh.*" (Berl. 1782); but it was not till comparatively recent times that the value of the work in an historical and philological point of view was recognised. Lachmann, who had submitted the poem to a critical examination, made known the result of his investigations in an edition published at Berlin, 1826, and again in his treatise "*Zu den Nibelungen und zur Klage*" (Berl. 1836). W. Grimm has also given a comprehensive analysis of the poem in his "*Deutschen Heldensage*" (Göt. 1829). Among the various translations into modern German, those of Simrock (Berl. 1827) and Pfitzer (Tüb. 1842) are the best. All the manuscripts of the N. comprise another poem under the title of "*Die Klage*," which treats of the burial of the heroes who fell in the conflict at Etzel's court, and the laments which were composed in commemoration of that event. It is of greater antiquity than the N., and, like it, the work of an unknown author. A critical analysis of the N. will be found in Carlyle's "*Miscellaneous Essays*."

**NICÆ'A.** See **NICE**.

**NICARA'GUA**, a republic of Central America, bounded on the n. by the republic of Honduras, on the w. by the Caribbean Sea, on the s. by the republic of Costa Rica, and on the e. by the Pacific; lat. 10° 45'—15° n.; long. 88° 20'—87° 20'; area, about 48,000 square miles; pop. estimated at 250,000, of whom about 30,000 are

whites, 10,000 negroes, the rest Indians and Mestizoes. N. is traversed by two ranges of mountains—the western, which follows the direction of the coast-line, at a distance of from 10 to 20 miles from the Pacific; and the eastern (a part of the great range of the Cordilleras), which runs nearly parallel to it, and sends off several spurs towards the Caribbean Sea. The former is generally high and volcanic, but sinks at times almost to the level of the plains. Between the two ranges lies a great interior basin, containing the lakes of N. (q. v.) and Managua. The principal rivers are the Rio Coco, or Segovia, forming part of the boundary between Honduras and N.; the Escondido, or Blewfields; and the San Juan, all of which flow into the Caribbean Sea. The eastern coast of N. is called the Mosquito Coast. The country is in many places densely wooded—the most valuable trees being mahogany, logwood, Nicaragua wood, cedar, and Brazil wood. The pastures are splendid, and support vast herds of cattle. The chief products are sugar-cane (softer and juicier than the Asiatic variety), cacao, cotton, coffee, indigo, tobacco, maize, and rice, with nearly all the fruits, &c. of the tropics, plantains, bananas, tomatoes, bread-fruit, arrow-root, citrons, oranges, limes, lemons, pine-apples, guavas, &c. The chief vegetable exports are sarsaparilla, aloes, ipecacuanha, ginger, copal, gum-arabic, caoutchouc, &c. The northern part of N. is rich in minerals, gold, silver, copper, iron, and lead, but the mines are not so carefully worked now as under the Spaniards. The incessant political distractions of the country have notoriously all but destroyed the material prosperity of the country. The trade is chiefly with Great Britain. In 1873, the exports amounted to 1,441,505 dollars; the imports to 1,536,090 dollars. The seat of government is Managua, with 8000 inhabitants; the largest town and former capital is St Leon, with a population of 25,000. The town of N. (q. v.) has a pop. of 8500.

N. was discovered in 1521 by Gil Gonzales de Avila, and conquered by Pedro Arias de Avila, the governor of Panama in 1522. In 1821—the great year of revolution in Central America—it threw off allegiance to Spain, and after a desperate and bloody struggle, secured its independence by the help of the “liberals” of San Salvador. N. now became the second state in the federal republic of Central America, but on the dissolution of the union in 1839, became an independent republic. In 1847–1848, a dispute broke out between N. and Great Britain about the Mosquito Coast, which led to some hostilities, and was only finally settled in 1860. Meanwhile, in 1855, a civil war had broken out between the so-called “Conservatives” and “Liberals,” which resulted in the victory of the latter, who were, however, obliged to call in the help of the slyce notorious Colonel William Walker (see *FILIBUSTERS*).

By the constitution of 19th August 1858, the republic of N. is governed by a president, who is elected by universal suffrage, and holds office for four years. There are two legislative chambers—the Senate and the House of Representatives. Liberty of speech and of the press exists, but is not absolutely guaranteed. The Roman Catholic religion, however, is the only one *publicly* tolerated, but the services of other religious bodies may be privately performed.

**NICARAGUA, LAKE** (native, *Cocibolca*), a sheet of fresh-water in the republic of the same name, 110 miles long, and from 30 to 50 broad. Its elevation above the Pacific, from which it is separated by a low range of hills—at one point only 48 feet higher than the lake itself—is little more than 100 feet. The principal rivers flowing into it are the Mayales and Manacoloja on the north, and the Frio on the south; the only one flowing out is the San Juan (formerly *Usaguadero*), which unites it with the Caribbean Sea. Its islands are numerous, lying mostly in groups; the principal are Ometepe Zapatero (uninhabited, but with extensive ruins and monolithic idols), Salatanani, and the Corales. It has at last been determined to cut an interoceanic ship-canal through the state of Nicaragua, the route being by way of the San Juan River and Lake Nicaragua. The whole distance by this route from ocean to ocean is 180½ miles; and, full advantage being taken of lake and river, 61½ miles of the total length will fall to the share of the new canal.

**NICARA'GUA**, or Ri'vas, a town of the republic of Nicaragua (q. v.), Central America, on the western shore of the Lake Nicaragua (q. v.), 35 miles south-south-east from Granada. It is not a place of much commerce, the commerce of the lake being chiefly carried on by Granada. Pop. 5500.

**NICA'STRO**, a town of Southern Italy, in the province of Calabria, is most beau-

Nicola  
Nice

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tifully situated west of the Apennines, on the margin of the coast plains, and commanding views of the sea, 24 miles south of Cosenza. It is the see of an archbishop. There are hot springs in the vicinity. Pop. stated at 7000 and 10,200.

NICCOLA PISANO, a distinguished sculptor of Pisa, to the influence of whose works the rise or restoration of sculpture in connection with Gothic architecture is infinitely attributable. There is no record of the date of his birth, but from an inscription on a celebrated fountain in Perugia, designed by him and executed by his son Giovanni, it is evident that he was born at the beginning of the 13th century. His earliest work is supposed to be the "Deposition" over one of the doors of the façade of the cathedral at Lucca, dated 1233. He worked on the principle of studying nature, modified or corrected by the ideal of antique sculpture; and it is said that he first adopted this principle from the sculpture on an ancient sarcophagus brought from Greece in the ships of Pisa; but though most of the finest specimens of Greek sculpture were not discovered till long after N.'s time, he must have had an opportunity of studying many important remains on the various classic ruins with which Italy abounds. This sculptor's reputation is supported by three important works, which remain and are still admired for their excellence—the pulpit of the baptistery at Pisa, the "Arca" or shrine of St. Dominic for the church of that saint at Bologna, and the pulpit of the cathedral at Siena. The first of these was finished in 1260, and is reckoned the most elegant pulpit in Italy. It is of white marble, six-sided, supported by seven Corinthian columns, and adorned with five bas-reliefs of subjects from the New Testament. The second work, the "Arca" of St. Dominic, is one of even greater extent. It is composed of six large bas-reliefs, delineating the six principal events in the legend of St. Dominic, and is ornamented with statues of our Saviour, the Virgin, and the four doctors of the church. The operculum or lid was added about 300 years afterwards. The subjects on the pulpit at Siena, the third of these works, are the same as those on that at Pisa, with the substitution of the "Flight into Egypt" and the "Massacre of the Innocents" for the "Presentation;" and the enlargement of the concluding composition, the "Last Judgment." In those compositions there is great felicity of invention and grouping, truth of expression, and grace in the attitudes and draperies; and in that of the "Last Judgment" the boldness displayed in the naked figures, twisted and contorted into every imaginable attitude, is wonderful, and evinces the skill with which N. drew on the antique and on nature. But it must be admitted that there is a degree of confusion or overfulness in the grouping, and that the heads of his figures are often large in proportion to the bodies; faults incidental to all early efforts. In this last work, it appears by the contract for its execution, that N. was assisted by his scholars Lapo and Arnolfo, and his son Giovanni; and this accounts for a certain feebleness that may be observed in portions of it. He died at Pisa, in 1276 or 1277, and was buried in the Campo Santo. N.'s influence on art extended widely; his pupils Arnolfo and Lapo executed numerous works at Rome, Siena, and other cities. His son and heir in reputation, though not his equal in talent, Giovanni Pisano, was constantly engaged on works of importance; in Pisa, where the Campo Santo (for he was also an architect) was erected from his designs; in Naples, which he visited on the invitation of Charles I. of Anjou; at Arezzo, where he executed the marble shrine of St. Donato for the cathedral; at Orvieto, the bas-reliefs on the *façerata* of the Duomo, by many ascribed to N., being by him; at Pistoja, where he executed the pulpit, &c. The year of his death is not ascertained; it was probably about 1320. After Giovanni's death, the Pisano school split into two principal branches. Florence and Siena; that of Naples may also be reckoned a branch, from the influence exercised over it by Giovanni. ANDREA PISANO, the ablest of Giovanni's pupils, was called to Florence to execute in marble the statues, bas-relief, &c., designed by Giotto in ornamenting the cathedral of S. Maria del Fiore, then in course of erection. The talent he displayed soon raised him to a high position and important employment. He executed numerous statues for the façade of the cathedral, and a bronze gate for the baptistery, of very great excellence. This gate still exists, along with the later and still more celebrated gates of Ghiberti. Under the influence of Giotto's genius, he became completely Giottesque in thought and style; and his works bear so distinctly the impress of that master-mind, that the design of many of them, and particularly the baptistery gate, are ascribed to Giotto. He died in 1345, aged 76. See Vasari; "Christian Art," by

Lord Lindsay; Agincourt, "Davla Memorie Istoriche;" Rosini, "Storia, &c.;" Cicognara (tom. 1.), "Monumenti Sepolcrali della Toscana."

NICCOLINI, Giovanni Batista, a distinguished modern poet, was born in 1785, in the vicinity of Pisa, of a noble but impoverished family. N.'s first literary efforts were full of high promise of the classical and antique beauties which characterise his finest compositions, and in 1810 he was crowned by the Crusca Academy. Through the influence of the queen of Etruria, he was appointed secretary of the Academy of Fine Arts, where he delivered to the young artists lectures on history and mythology; but on the fall of the Bonaparte sovereigns, this post was withdrawn from the poet. In 1805, the Grand Duke Ferdinand appointed him librarian in the Pitti Palace, an office he resigned in order to escape the servility of court dependence. By the death of a relative, he acquired wealth and the power of exclusively devoting himself to literature, and published several much-admired essays and lectures; and in 1827 appeared his noble work, "Antonio Foscari." In 1844, N. published anonymously his best poem—"Arnolfo da Brescia"—and nothing finer has been written in modern Italian, whether it be viewed as a classical creation, full of life and poetry, or as a work of glowing patriotism. N. lived in the enjoyment of fame and honours to a ripe old age, and died at Florence in 1861.

NICE, or Nicæa, formerly a city of Bithynia, in Asia Minor, situated on the eastern shore of Lake Ascania. It was built, or rather rebuilt (for an older town had existed on its site), by Antigonus, the son of Philip (316 B.C.), and received the name of Antigonela, which Lysimachus changed to Nicæa, in honor of his wife. It was a handsome town, and of great importance in the time of the Roman and Byzantine emperors; all the streets crossed each other at right angles, and from a magnificent monument in the centre the four gates of the city were visible. It is famous in ecclesiastical history for two Councils held in it, the First and Seventh Ecumenical Councils. The FIRST COUNCIL OF N. was held 325 A.D., and was convened by the Emperor Constantine, in concert, according to Roman Catholic historians, with the Roman pontiff, for the purpose of defining the questions raised in the Arian (q. v.) controversy. The details of the proceedings, so far as regards Arius, will be found in that article. The supporters of Arius at first are said to have numbered upwards of twenty; but ultimately the decree condemning him was subscribed by the whole body of the Council, the number of dissentients being, according to the highest computation, only five, while the most probable account reduces it to two. The NICENE CREED adopted in this Council forms the subject of a separate article. In addition to the Arian question, the Council of N. also deliberated on a schism, called the Meletian Schism, which at that time divided the church of Egypt, and the particulars of which have formed a subject of recent controversy. The decree of N. appears to have been founded on a compromise, but did not effectually suppress the schism. The decree of N. on the celebration of Easter was of wider application, and met with universal acceptance, the few recusants being henceforward called Quarto-decimans (q. v.). This Council also enacted twenty canons of discipline. For a minute and picturesque description of this council, see Dean Stanley's "History of the Eastern Church."—The SECOND COUNCIL OF N., called also the Seventh Ecumenical Council, was assembled under the Empress Irene (787), who was regent during the minority of her son Constantine, for the purpose of reconsidering the subject of Images. The tenor of the decree on Images is detailed under that head. In the West, the question of the acceptance of this council was the subject of considerable controversy, arising, in great measure, from a grossly erroneous Latin translation of the acts, which for a time obtained extensive circulation.

NICE (Ital. Nizza), chief town, since 1860, of the department of the Alpes Maritimes, France, is situated on both sides of the river Paglione, 100 miles south-south-west of Turin, in lat. 43° 42' N., and long. 7° 17' E. Pop. (1872) 42,363. It consists of three principal parts—the *Quartier de la Croix de Marbre*, or *New Town* (on the right bank of the Paglioue), the *Old Town*, and the *Port*. The first of these is much frequented by foreigners, particularly English (whence its name of "English town"). It is close upon the river, has a handsome quay filled with gay shops, and a splendid square called the Jardin Public. Two bridges over the Paglioue connect it with the Old or Upper Town, which extends back to the foot of a hill called the Castle Hill.

Nicene  
Nicholas

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The Old Town is excessively dirty, and has narrow, stinking streets, with macaroni and confectionary shops, grocery establishments, slaughter-houses, &c. The Port, almost separated from it by the Castle Hill, is crowded with a seafaring population. The harbor admits vessels drawing fifteen feet of water, but is difficult of entrance. The Castle Hill, an isolated mass of limestone 800 feet high, receiving its name from having been formerly crowned by a strong castle, now in ruins, is laid out in public gardens, and affords an extensive and splendid prospect out to sea. The chief public buildings are in the Corso, or in the adjoining streets, in one of which there is an English library and reading-room. There is an Episcopalian and also a Presbyterian church in N. and an English cemetery. The most attractive promenade in the Old Town is the *Terrace*, from 15 to 20 feet high, erected as a protection to the town against a stormy sea. But the most agreeable and fashionable drive and promenade is the *Promenade des Anglais*, extending for a mile along the shore from the right bank of the Paglione, and skirted on one side by elegant villas and hotels. Beggars are numerous, owing, doubtless, to the great influx of visitors. Fine as the usual winter and spring weather of N. is, it is exposed to the north wind, or *Mistral*, which during these seasons often brings a temperature which in England would be considered cool, or even cold, in April or October. The *Quartier Carabasi* is the most sheltered part of the place, and therefore the best for an invalid. Dust and bad drainage are the drawbacks to the amenity of N.; but this is true with regard to most of the places of winter resort in the south. The mean January and February temperature is 47°, equal to that of April in England; March is 52°; April 59°, about the same as June in England, or July in Scotland.

The ancient Ligurian town of Nicæa, founded, it is said, by a colony of Phœceans from Massalia (Marseille), became subject to Rome in the 2d c. b.c. It probably occupied the Castle Hill, rather than the site of the present city. Subsequently it passed into the hands of the Goths, Burgundians, Visigoths, kings and counts of Arles, the Angevine sovereigns of Naples, and the Dukes of Savoy (1888), in whose family it remained till 1860, when it was ceded to France.

**NICENE CREED**, a detailed statement of doctrine, which forms part of the liturgy of the Roman, Oriental, and Anglican Churches, and is also received as a formulary by many of the other Protestant communions. It was drawn up principally by Hosius of Corduba, and is called by the name of the Council of Nice, although nearly one-half of its present clauses formed no part of the original Nicene formulary; while, on the other hand, that document contained a series of anathemas condemnatory of specific statements of Arius, which find no place in the present so-called Nicene creed. The distinctive characteristic of the creed drawn up in the Council was the word *Homousios*. (See HOMOUSIAN.) Its clauses correspond (except in a few verbal details) with those of the modern formulary as far as the words "I believe in the Holy Ghost;" after which follow the anathemas referred to above. The remaining clauses of the present creed, although they seem to have been in public use earlier, were formally added in the First Council of Constantinople (381), with the exception of the clause, "And from the Son," which was introduced in various churches of the West in the 5th and 6th centuries; and ultimately its formal embodiment in the creed, has continued a subject of controversy with the Greeks to the present day. See GREEK CHURCH. This creed appears to have been used in the public liturgy from the latter part of the 5th century. Its position in the liturgy varies in the different rites. In the Roman liturgy it is read on all Sundays, feasts of our Lord, of the blessed Virgin Mary, apostles' days, and all the principal festivals, but not on week-days, or the minor saints' days.

Several Arian creeds, in opposition to that of Nice, were drawn up at Sirmium and elsewhere (see LIBERIUS), but none of them met with general acceptance.

**NICHE**, a recess formed in a wall to contain a statue or some ornamental figure. In classic architecture, the niches are generally square recesses with canopies formed by small pediments. In Gothic architecture, the niche is one of the most frequent and characteristic features; the doorways, buttresses, and every part of the buildings being in many instances ornamented with niches and statues in endless variety.

**NICHOLAS**, the name of five among the Roman pontiffs, of whom the following alone appear to call for separate notice.—N. I. was born of a noble Roman

finally, and on the death of Benedict III., in 858, N. was elected to succeed him, and was consecrated in St Peter's Church, in the presence of Ludwig II., emperor of Germany. The earliest incident of importance of his pontificate is his conflict with Photius (q. v.), who had been intruded into the see of Constantinople after the deprivation of Ignatius. N. demanded from the emperor the restoration of Ignatius, as well as the withdrawal of certain attempted invasions of the jurisdiction of the West. On the refusal of his demands, N. excommunicated Photius (see GREEK CHURCH), and that patriarch, in return, assembled a council at Constantinople, and retorting upon his rival the same sentence, alleged that with the translation of the seat of civil sovereignty from Rome to Constantinople the ecclesiastical supremacy was likewise transferred. The Emperor Michael supporting Photius in his claim, N. failed to command submission to his sentence; nor was it till the following reign, that of Basil the Macedonian, that Photius was deposed, and Ignatius restored to his see. Meanwhile, however, N. had been embroiled with the Emperor Ludwig. The pope had been appealed to by the unjustly divorced wife of Ludwig's younger brother, Lothaire, king of Lorraine, and had appointed legates to inquire into and report upon the case; and the legates having exceeded their powers by giving a sentence in favor of Lothaire, the pope declared their sentence null, and excommunicated them. Ludwig espoused their cause, and marched his troops to Rome, in order to enforce satisfaction. After some hostile demonstrations, the emperor, terrified, it is said, by his own sudden illness, and some fatalities which befell his followers, desisted from the enterprise, and withdrew his troops. Lothaire was forced to make submission; the decree of N. was enforced, and Theutberga was formally reinstated in her position as a wife and queen. N. died in 868—NICHOLAS V. was originally called Thomas Parentucelli. Born at Pisa in 1398, he was educated at Florence and Bologna, and having fixed his residence in the latter city, he was eventually named bishop of that see by the pope, Eugenius IV. During the troubled period of the Councils of Basel and Florence, and in the difficult negotiations with the German and other churches which arose therefrom, he conducted himself with such ability and prudence, that on the death of Eugenius IV. he was chosen to succeed him on March 6, 1447. At this time the anti-pope, Felix V., still maintained himself, although supported by a very small party; but N. prevailed on him to abdicate, and thus restored the peace of the church in 1449. In the judgment of the literary world, however, the great distinction of the pontificate of N. lies in the eminent service which he rendered to that revival of letters which dates from his age. The comparative repose in which he found the world at his accession, enabled him to employ, for the discovery and collection of the scattered master-pieces of ancient learning, measures which were practically beyond the resources of his predecessors. He despatched agents to all the great centres, both of the East and of the West, to purchase or to copy every important Greek and Latin manuscript. The number collected by him was above 5000. He enlarged and improved the Roman university. He remodelled, and may almost be said to have founded, the Vatican Library. He caused translations to be made into Latin of most of the important Greek classics, sacred and profane. He invited to Rome the most eminent scholars of the world, and extended his especial patronage to those Greeks whom the troubles of their native country drove to seek a new home in the West. Alarmed by the progress of the Turkish arms in Asia, he endeavored to arouse the Christian princes of Europe to the duty of succoring their brethren of the East; but the age of enthusiasm was past, and he was forced to look on inactively at the fall of Constantinople in 1453. This event, by forcing a large number of learned Greeks to repair to Italy and other countries of the West, contributed powerfully to that progress of learning which N. had deeply at heart; but he scarcely lived to enjoy this result, having died two years later, in 1455, at the comparatively early age of 57. He must not be confounded with an anti-pope of the same name, Peter de Corbario who was set up, in 1393, by Ludwig of Bavaria, in antagonism to John XXII. (q. v.).

NICHOLAS I., more properly Nikolai Panlovitch, emperor of Russia, was the third son of Paul I., and was born at St Petersburg, 7th July 1796. He was very carefully educated under the eye of his mother, a princess of Würtemberg, and subsequently devoted his attention to military studies and political economy, without,

however, giving evidence of any natural capacity for these subjects. He visited England and other European countries in 1816, and in the same year made a tour through the Russian provinces. On 13th July 1817, he married Frederika-Louisa-Charlotte-Wilhelmina, the eldest daughter of Frederic William III. of Prussia, and lived in domestic retirement till the death of Alexander I. (December 1825), when, owing to the resignation of his elder brother Constantine, he succeeded to the throne of Russia. A long-prepared military conspiracy broke out immediately after his accession, which he suppressed with great vigor and cruelty. Capital punishment, which had been abolished by the Empress Elizabeth, was revived, for the purpose of inflicting it upon the leaders of the insurrection. The rebels were hunted down with merciless energy, and in no case, even after the rebellion ceased to be in the least degree dangerous, was their punishment commuted. Instead of pursuing the course upon which Alexander had entered—cultivating the mind of the nation, so as to base his government upon education and intelligence—N., after a brief ebullition of reformatory zeal, reverted to the ancient policy of the Czars, absolute despotism, supported by mere military power. His first great measure, the codification of Russian law, was commenced in 1827, and completed in 1846.

Soon after his accession, a war with Persia commenced, but it was concluded on 28th February 1828, by the peace of Turkmanshai, which gave a considerable extent of territory to Russia. In the same year he entered upon a war with Turkey, in which victory, though at enormous cost, constantly attended his arms, and the peace of Adrianople (q. v.) obtained for Russia another increase of territory, the free navigation of the Danube, with the right of free passage between the Black and Mediterranean Seas. The political movements of 1830, in the west of Europe, were followed by a national rising of the Poles, which was suppressed after a devastating contest of nine months, in which the utmost efforts of the whole military resources of Russia were required. N. punished the rebellion by converting the kingdom of Poland into a mere Russian province, and strove to extinguish the Polish nationality. This policy, however, was viewed with great dissatisfaction throughout Europe, and the vanquished Poles were everywhere regarded with general sympathy. Russia, by N.'s mode of government, became more and more separated from the fellowship of the western nations. Intellectual activity was, as far as possible, restrained to things merely practical, education limited to preparation for the public service, the press was placed under the strictest censorship, and every means used to bring the whole mind of the nation under official guidance. His Slavism (q. v.) also prompted him to Russianise as much as possible all the inhabitants of the empire, and to convert Roman Catholics and Protestants to the Russian Greek Church, of which the Czar is the head. The independence of the mountaineers of the Caucasus was inconsistent with his schemes, and war was consequently waged against them with the greatest energy and perseverance, although with little success, and at the cost of immense sacrifices both of money and lives. The extension of British influence in Central Asia was also viewed by him with alarm, and was attempted to be counteracted by various means, amongst which was the expedition for the conquest of Khiva in 1839, which failed so signally (see *KHIVA*). Between 1844 and 1846, he visited England, Austria, and Italy. During the political storm of 1849—1850 he abstained from interference, watching, however, for an opportunity of doing so with advantage to Russian interests. The opportunity was at last found in the request of the emperor of Austria for his assistance to quell the Hungarian insurrection. This good service rendered Austria, as he thought, a faithful and firm ally. He succeeded at the same time in drawing closer the bonds of alliance between the Russian and Prussian monarchies, a proceeding fraught with the most mischievous consequences to the latter power. The re-establishment of the French empire still further tended to confirm these alliances, and led N. to think that the time had at length come for carrying into effect the hereditary Russian scheme for the absorption of Turkey; but the unexpected opposition of Britain and France, and his own invincible repugnance to give up his long-planned scheme of conquest, brought on the Crimean War, during the course of which he died at St Petersburg, March 2, 1855, of atrophy of the lungs; but his death was undoubtedly hastened by chagrin at the repeated defeats which his arms sustained, and by over-anxiety and the excessive labor he underwent to repair his losses. He was remarkable for temperance, frugality, and patriotism,

but equally so for vanity and ostentation. He was fanatically beloved by his Russian subjects, and was at the same time regarded by them with feelings of awe, a tribute to his lofty stature and imperial deportment, which gave him the most intense pleasure. This extreme vanity seems, to some extent, to have affected his mind, and to have been partly the cause of his political blundering towards the close of his reign.

NICHOLSON, John, British general, one of the most distinguished of the later school of Indian soldiers, was born in Dublin, 11th December 1821. His father, a physician of considerable reputation in that city, died when the boy had just completed his 8th year. By his mother, a woman of strong sense and much practical piety, he was carefully educated; and from her he seems to have inherited or imbibed a certain religious gravity and earnestness of character which was early noted in him, and continued to distinguish him through life. Through the influence of her brother, Sir James Weir Hogg, an Indian cadetship was obtained for him; at the age of 16, he arrived in Calcutta, and was soon after posted to the 21st Native Bengal Infantry, then stationed at Ferozepore. In 1840, his regiment was ordered to Ghizni in Afghanistan, where two years after, in the disastrous insurrection which avenged our occupation of the country, it was compelled to surrender to the enemy. After a time of miserable captivity, he regained his liberty, and joined the relieving army under General Pollock, to be saddened immediately after by the death, in action, of his brother Alexander. A period of inactivity ensued, during which he was stationed at Meerut, doing duty as adjutant of his regiment. On the breaking out of the Sikh war in 1845, he served in the campaign on the Sutlej, and was present at the battle of Ferozeshah, though, as attached to the commissariat department, without special opportunity of distinguishing himself. After the cessation of the war, through the recommendation of Colonel (afterwards Sir Henry) Lawrence, N., now a lieutenant, was appointed assistant to the resident at the conquered capital, Lahore, and thus fairly transferred to the political branch of the service, in which most of his future time was passed. But shortly, with the outbreak of the Sikh rebellion in 1848, there came an interlude of military activity, in which he greatly distinguished himself. To N.'s daring and promptitude was due the preservation to us of the important fortress of Attock; and soon after, his success at the Margulla Pass, in intercepting and defeating a large body of the insurgents, brought his name prominently before the world. Throughout the struggle which followed, he rendered important service; and at the great battles of Chillianwalla and Gujerat successively, he earned the special approval of Lord Gough, to whom he was immediately attached.

The Punjab having finally become a British province, Captain N. was appointed a deputy-commissioner under the Lahore Board, of which Sir Henry Lawrence was president. He had now been nearly ten years in India; his strength was somewhat shaken by arduous service, and various illnesses which from time to time had assailed him; and above all, he was anxious to visit and console his widowed mother; then prostrated by the death in India, by an accident, of William, his younger brother. In 1850, accordingly, he took his furlough, and returned home, taking Constantinople *en route*, and visiting, with an eye to professional instruction, the capitals of all the great military powers of the continent. On his return to India, he was again appointed by Lawrence a deputy-commissioner in the Punjab, and for five years subsequently his work lay among the savage tribes of the frontier. His success in bringing them under thorough subjection to law and order, was something marvellous; and such were the impressions of fear and reverence wrought by the force and massive personality of the man, that he became among these rude populations, under the title of "Nikkul Seyn," the object of a curious kind of hero-worship. So far was this carried, that a sect actually arose, of Nikkul-Seynees, who consecrated him as their Guru (or spiritual guide), and persisted—despite of severe floggings regularly inflicted by the worthy man, indisposed to accept of divine honors—in falling at his feet, and making him an object of express adoration.

With the outbreak of the great mutiny in 1857 came N.'s supreme opportunity, and the brief career of glorious achievements in which he developed in the eye of the world the full power and splendor of his military genius. In the saving of the Punjab, virtually India was saved to us; and under Sir John Lawrence, who had succeeded his brother, Sir Henry, N.—though not without noble coadjutors to



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divide with him the honor—perhaps did more than any other single man to hold firm our grasp of the Punjab. He it was who suggested the formation of the famous movable column, by which mainly the work was done, and presided over its organisation. Shortly, he was appointed to command it; and in his dealings with the suspected regiments of sepoys, he exhibited a particular combination of boldness with subtlety, discretion, and astuteness, scarcely too much to be admired. At Trimmu Ghaut, on the 12th and 14th of July, he brought to bay, and nearly utterly annihilated, a large force of the declared rebels. Things thus made safe behind him, he marched to reinforce the army of General Wilson, engaged in the siege of Delhi, arriving in camp on August 7. His presence and counsels gave new impulse to the operations; and in every way he strove, with fiery and impatient energy, to expedite the delayed assault. A strong body of the enemy having tried to make their way into the British rear, to N. was assigned the task of intercepting and bringing them to battle. This he achieved on August 24, near Nujuffghur—under circumstances of extreme difficulty, in the most masterly manner surmounted—obtaining a most brilliant result in the complete ruin and dispersion of the mutineers. When the assault on the city was at last ordered, General N. (for to this rank he had now attained) was selected for the post of honor; and on the morning of September 14, he led the first column of attack. After the troops had forced their way into the city, an unforeseen check occurred, and N., ever in front, exposed himself in the most fearless manner to animate his men to advance. Conspicuous by his towering stature, he became the mark of the enemy's bullets, and fell, shot through the body. He lingered for some time in great suffering, and died on the morning of the 23d. Over the whole of India the victory was saddened by his death; for it was felt that in John N., to use Lord Canning's expression, "a tower of strength" had fallen. During the whole war of the mutiny, though it claimed many noble victims, there fell no man more regretted in his death than N., or in his death more worthy of regret. Throughout his career he shone—as opportunity offered—a veritable "king of men," one of those born to command, who naturally and inevitably rise to it, and however great in achievement, seem to need only the hap of ampler opportunity in the future, to outdoar their great achievements in the past. No one ever seems to have come fairly in contact with him without being strangely impressed with this sense of a magnificent reserve of power in him. It remains only to add, that his nature was on the one side as gentle, tender, and affectionate, as on the other it was strong and brave; and that, by all who had intimate relations with him, he was not less beloved for his mild virtues, than for his sterner gifts honored and admired. To his memory all honor was paid. The Queen commanded it to be officially announced that, had he lived, he would have been created a Knight Commander of the Bath; and by the East India Company, a special grant of £500 a year was voted to the mother who survived to mourn for him. For further details of the life of this man of right noble and heroic mould, the reader is referred to the account of him—from which this little sketch is redacted—given in Kaye's most interesting work entitled "Lives of Indian Officers" (2 vols., Lond., A. Strahan & Co., 1867).

NÍCIAS, a famous Athenian statesman and general during the Peloponnesian War, was the son of Niceratus, a very wealthy citizen, who had acquired his fortune by working the silver-mines at Laureum. N. belonged to the aristocratic party, and after the death of Pericles, presented himself as the opponent of Cleon, the great popular or demagogic leader. He was not a man of quick, brilliant, audacious genius, like Alcibiades; on the contrary, he was remarkably wary and cautious, even at times to timidity. Success generally accompanied his enterprises against the Spartans and their allies. In 427 B.C., he captured the island of Mitros; next year he ravaged the island of Melos and the coasts of Locris; the year following that, he obliged the Spartan force in Sphacteria to surrender, and also defeated the Corinthians. In 424 B.C., he made havoc of part of Laconia, captured the island of Cythera, and achieved several other successes. After the death of Cleon, he brought about a peace between the Spartans and Athenians, 421 B.C. Six years afterwards, the Athenians, at the instigation of Alcibiades, resolved on a great naval expedition against Sicily. N. was appointed one of the commanders, although he had strongly protested against the undertaking. In the autumn of 415 B.C., he laid siege to Syracuse and was at first successful, but subsequently experienced a series of disasters; his fleet was destroyed, and his troops began a retreat towards the interior

of Sicily. They were speedily forced to surrender, and N. was put to death 414 B. C. See Thirlwall's and Grote's "Histories of Greece," and Plutarch's "Life of Niclas."

**NICKEL** (symbol, Ni; equiv. 29.5—new system, 50—sp. grav. 8.3) is a grayish-white glistening metal, capable of receiving a high polish, of about the same hardness as iron, and, like that metal, malleable and ductile. It has about the same fusibility as wrought iron, but is less readily oxidised than that metal, since it remains unchanged for a long time in a moist atmosphere, and is very little attacked by dilute acids. It is strongly magnetic, but loses this property when heated to 660°. It dissolves in hydrochloric and dilute sulphuric acid with a development of hydrogen gas, and is very readily oxidised in nitric acid.

N. only occurs in the native state in meteoric stones, in which it is always present in association with the iron which forms the principal part of those masses. It is found in tolerable abundance in Saxony, Westphalia, Hungary, Sweden, &c., where it occurs in the form of *kupfernickel* (so called from its yellowish-red color), which is a combination of N. and arsenic. The metal is obtained on the large scale (for the purpose of making German silver (q. v.) and other alloys) either from this compound or *spess*, which is an impure arsenio-sulphide of N., formed during the manufacture of *Small* (q. v.) by somewhat complicated chemical processes. In small quantities, it may be obtained by reducing one of its oxides by means of hydrogen at a high temperature, or by exposing the oxalate to a very high temperature in a crucible lined with charcoal.

N. forms two compounds with oxygen—viz., a protoxide, NiO, and a sesquioxide,  $\text{Ni}_2\text{O}_3$ , which is not basic, and may be passed over without further notice. The *protoxide* occurs as a greenish-gray powder, which exhibits no magnetic properties, and is insoluble in water. It is obtained by heating the carbonate or the *hydrated protoxide* in a closed crucible. The hydrated protoxide,  $\text{NiO} \cdot \text{HO}$ , is obtained by precipitation from a solution of one of its salts by potash. The salts of the protoxide and their solutions are of a delicate, very characteristic green color; but in the anhydrous state most of them are yellow. The neutral salts, soluble in water, slightly reddened litmus, have a sweetish astringent metallic taste, and when administered in moderate doses, excite vomiting. The most important of the salts is the sulphate ( $\text{NiO} \cdot \text{SO}_3 + 7\text{Aq}$ ), which crystallises in beautiful green rhombic prisms. It is obtained by dissolving the metal or its oxide in dilute sulphuric acid; and is the source from which the other salts of N., the carbonate, oxalate, &c., are obtained. The principal use of N. is in the composition of various alloys, such as German Silver (q. v.).

The sulphate of N. has been prescribed successfully by Professor Simpson in cases of severe headache.

**NICOBAR ISLANDS**, a group of islands in the Indian Ocean, north-west of Sumatra, and forming, with the Andamans (q. v.), an extension of the great island chain of which Java and Sumatra are the principal links. Lat.  $6^\circ 40' - 9^\circ 20'$  N., long.  $93^\circ - 94^\circ$  E. They are divided by the Sombrero Channel into two groups, of which the principal members are the Great N. (area about 260 square miles), and the Little N. (area 86 square miles). The inhabitants, who are not numerous, are distinct from Malays and Burmese, and are said to resemble the hill-tribes in Formosa. The Danes made a settlement here in 1754, were dispossessed by Great Britain from 1807 to 1814, and finally withdrew in 1848. In 1869, the Indian government took possession of these islands, and affiliated a new settlement at Nancowry Harbor to the great penal colony at Port Blair in the Andaman Islands. The soil is fertile, and the cocoa-nut palm grows abundantly.

**NICOLAI**, Christoph Friedr., a celebrated German author, bookseller, and publisher, was born 18th March 1733, at Berlin, where his father was also a bookseller. He devoted himself very earnestly to literary and philosophical studies, and early distinguished himself by his "Briefe über den jetzigen Zustand der schönen Wissenschaften" (Berl. 1756), in which he exposed the errors of both Gottsched and Bodmer, then carrying on a controversy which was agitating the literary world of Germany. He became the associate of Lessing and Moses Mendelssohn. Jointly with the latter, he edited for some time the admirable "Bibliothek der schönen Wissenschaften" (Leip. 1757—1758); and with Lessing, he gave to the world

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"Briefe die neueste deutsche Literatur betreffend (24 vols. Berl. 1759—1765). By this he was led to conceive the plan of the "Allgemeine deutsche Bibliothek" (106 vols. 1765—1792), a periodical which he edited for many years, and which contributed much, particularly in the early period of its existence, to the progress of literature and improvement of taste in Germany, but was too frequently characterised by an undue acerbity of tone. N.'s hostility to the new schools of literature and philosophy, which sprang up in Germany, exposed him to attacks from the pens of Herder, Goethe, Schiller, Lavater, and Fichte. His death took place 8th January 1811.

Among N.'s works may be mentioned his "Topographisch-historische Beschreibung von Berlin und Potsdam" (Berl. 1769, 8d edit. 1786); "Characteristisches Anecdoten von Friedrich II." (Berl. 1788—1792), both of permanent value; some novels, as his "Leben und Meinungen des Magisters Sebalduß Nothhauker" (4th edit. Berl. 1799); "Geschichte eines dicken Mannes," a sharply satirical performance (3 vols. Berl. 1794); "Beschreibung einer Reise durch Deutschland und die Schweiz" (Berl. 1781; 8d edit. 12 vols. 1788—1796); an autobiography, published in the "Bildnisse jetzt lebender Berliner Gelehrten;" and a work entitled "Ueber meine gelehrte Bildung, über meine Kenntnisse der Critischen Philosophie und meine Schriften dieselbe betreffend" (Berl. 1799).

NICOLAÏ, Otto, a German musical composer of note, born at Königsberg in 1369. His early life was a struggle with poverty and difficulties. He studied for three years in Berlin under Klein; and in 1835 went to Rome, where he went through three more years of study under Baldi. After travelling for ten or twelve years over Europe, he became, in 1847, Kapellmeister at Berlin, a post which he soon resigned. He appeared as a composer of dramatic music as early as 1831; but his first work of importance was "Il Templario," founded on Scott's romance of "Ivanhoe," which, produced at Turin in 1841, attained a high and permanent reputation. In 1848, he wrote at Berlin "Die Lustigen Weiber von Windsor," on which his renown as a musician is founded, a work charming for its clear design and lively vigorous tone, whose overture is almost worthy of Weber. Two months after the production of this his *chef d'œuvre*, its composer died at Berlin.

NICOLAS, St., a highly popular saint of the Roman Catholic Church, and revered with still greater devotion by the Russian Church, which regards him as a special patron, was one of the early bishops of Myra in Lycia. The precise date of his episcopate is a subject of much controversy. According to the popular account, he was a confessor of the faith in the last persecution under Maximilian, and having survived until the Council of Nice, was one of the bishops who took part in that great assembly. This, however, seems highly improbable. His name does not occur among the signatures to the decrees, nor is he mentioned along with the other distinguished confessors of the faith who were present at the council, either by the historians, or what is more important, by St Athanasius. He may, with more probability, be referred to a later period; but he certainly lived prior to the reign of Justinian, in whose time several of the churches of Constantinople were dedicated to St Nicolas. Of his personal history hardly anything is certainly known, and the great popularity of the devotion to him rests mainly on the traditions, both in the West and in the East, of the many miracles wrought through his intercession. He is regarded, in Catholic countries, as the especial patron of the young, and particularly of scholars. In England, his feast was celebrated in ancient times with great solemnity in the public schools, Eton, Sarum, Cathedral, and elsewhere; and a curious practice, founded upon this characteristic of St N., still subsists in some countries, especially in Germany. On the vigil of his feast, which is held on the 6th December, a person in the appearance and costume of a bishop assembles the children of a family or of a school, and distributes among them, to the good children, gift nuts, sweetmeats, and other little presents, as the reward of good conduct; to the naughty ones, the redoubtable punishment of the "Klaubauf." The supposed relics of St N. were conveyed from the East to Bari, in the kingdom of Naples, towards the close of the 11th c.; and it is a curious fact that in the Russian Church the anniversary of this translation, 9th May, is still observed as a festival.

NICOMEDEIA, the capital of ancient Bithynia, was situated at the north-eastern angle of the Gulf of Astane, in the Propontis, now called the Bay of Ismid, was built about 264 A.D. by Nicomedes I., who made it the capital of his kingdom, and

It soon became one of the most magnificent and flourishing cities in the world, and some of the later Roman emperors, such as Diocletian and Constantine the Great, selected it for their temporary residence. It suffered greatly both from earthquakes and the attacks of the Goths. Constantine died at a royal villa in the immediate vicinity. Hannibal committed suicide in a castle close by. It was the birthplace of the historian Arrian. The small town of Ismid or Ienikmid now occupies its site, and contains many relics of ancient Nicomedeia.

NICO'POLIS, recently a Turkish fortress, but since 1878 a city of the newly constituted principality of Bulgaria, is on the Danube, about 66 miles west of Rustchuk. The fortifications, though extensive, were never of much importance, and the Berlin Congress of 1878 provided for their demolition. The city used to be divided into two portions; the fortress and Turkish town, defended on every side by batteries and ramparts, and the eastern quarter, comprising the dwellings of the Bulgarians, Wallachs, and Jews. N. is widely built, most of the houses being surrounded by gardens. It is an important market for Wallachian wares, but otherwise is not a great centre of trade. Wine is produced in the vicinity. Pop. 16,000.

N., the ancient *Nicopolis ad Istrum*, was founded by Trajan, and fragments of the old wall still remain. Here the Hungarians, under their king Sigismund, were defeated by the Sultan Bajazet I. in 1396. The city gives title to a Greek archbishop and to a Catholic bishop.

NICOTIA'NA. See TOBACCO.

NICOTINE, or Nicotylia ( $C_{10}H_{14}N_2$ ), is one of the natural volatile oily bases destitute of oxygen, and constitutes the active principle of the tobacco plant, in the leaves, roots, and seeds of which it occurs in combination with malic and citric acids. It is likewise contained in the smoke of the burning leaves. It is a colorless, intensely poisonous liquid, of specific gravity 1.027 at 66°, which boils at 490°, evolves a very irritating odor of tobacco, especially on the application of heat, is very inflammable, and burns with a smoky flame. It is moderately soluble in water, and dissolves readily in alcohol and ether. If exposed to the air, it absorbs oxygen, and becomes brown, and ultimately solid. The quantity of N. contained in tobacco varies from 2 to 8 per cent.; the coarser kinds containing the larger quantity, while the best Havannah cigars seldom contain more than 2 per cent., and often less.

A remarkable case of poisoning by N.—that of the Count Bocarmé, who was tried and executed in Belgium for the murder of his brother-in-law—is recorded in the "Annales d'Hygiène" (1851), and was the occasion of Orfila's publishing his "Mémoire sur la Nicotine." A distinguished student of the College of Chemistry subsequently employed it for the purpose of suicide. The deaths that have taken place from the use of tobacco in the form of injection—of which several cases are on record—were doubtless due to the action of this substance.

NICOSI'A, a city of Sicily, in the province of Catania, 70 miles south-west from Messina. It is situated on the crest of a steep conical hill between two head-branches of the Salso. It has scarcely any manufactures, but carries on some trade in corn, wine, oil, and cattle. Near it are beds of alum, schist, a rich mine of rock-salt, and springs of petroleum. Pop. 14,250.

NIEBUHR, Karsten, a distinguished geographer and traveller, was born in 1738, in the Hanoverian territory of Hadeln, on the confines of Holstein. Being early thrown on his own resources, he spent several years of his youth in the position of a day-laborer; but his natural energy having led him to apply himself to the study of geometry, and having acquired a small property, he went to Göttingen, where he attended the classes at the university until his resources were wholly exhausted. At this period he entered the Danish service, and in 1761 he joined the scientific expedition which King Frederick V. sent to explore certain portions of Arabia, with a view of illustrating some passages of the Old Testament. The expedition reached Cairo at the close of the year 1761, and after having carefully explored the pyramids, and crossed the desert to Mount Sinai and Suez, proceeded to Arabia Felix. Here, however, the various members of the expedition, which included the eminent naturalist Forsskal, all perished with the exception of N., who had himself suffered severely from fever. After the untimely death of his companions, he adopted the diet and dress of the natives—a measure to which he was probably indebted for

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the good health which he enjoyed during the rest of the travels, which he prosecuted with extraordinary resolution for more than six years. He proceeded as far as India, visiting also Persia and Asiatic Turkey, and continued the observations and researches of his late colleagues in addition to his own special geographical investigations. On his return to Denmark, in 1767, N. at once devoted himself to the task of publishing the results of his important mission, which appeared in German under the following titles, "*Beschreibung von Arabien*" (Copenh. 1772), and "*Reisebeschreibung von Arabien und andern umliegenden Ländern* (Copenh. 1774—1778, 2 vols.); the publication of the third volume of this work was unfortunately delayed, in consequence of the pressure of numerous other engagements arising from his professional and official duties, and it was not till more than twenty years after his death that the book made its appearance under the supervision of N.'s daughter, and through the liberality of the eminent bookseller Perthes of Hamburg. In addition to these valuable observations, N. edited and published at his own cost the natural-history notes of his deceased friend and fellow-traveller, P. Forskål which he arranged in two works, "*Descriptiones Animalium*" &c. (Copenh. 1775), and "*Flora Egyptiaco-Arabica*" (Copenh. 1776). The accuracy of detail, fidelity of delineation, and careful avoidance of all exaggeration, which characterise N.'s geographical and social descriptions of Arabia and other Asiatic countries, have made his works classical text-books for all who wish to study the subject. Although N. accepted, in 1778, a civil post, which fixed his residence in the remote provincial town of Meldorf, in the Ditmarsh district of Holstein, where he devoted himself during the rest of his life to the fulfilment of his official duties, he never relinquished his interest in scientific inquiry, and contributed several valuable papers on the geographical and political history of the nations of the east to the "*Deutsche Museum*," and other periodicals. He died in 1815, leaving a character of being at once one of the most truthful and scientifically exact travellers of modern times.

NIEBUHR, Barthold Georg, one of the most acute historians, critics and philologists of modern times, was born August 27, 1776, at Copenhagen, where his father, Karsten Niebuhr (q. v.) then resided. The aptitude for learning which N. displayed almost from infancy, led him to be regarded as a juvenile prodigy, and unlike many other precocious children, his powers of acquiring knowledge kept pace with his advancing years. After a carefully conducted preliminary education, under the superintendence of his father, he spent a session at Göttingen studying law, and from thence proceeded in his 19th year to Edinburgh, where he devoted himself more especially to the natural sciences. On his return to Denmark, he became private secretary to the finance minister, Schimmelmann, and from that period till 1804 held several appointments under the Danish government, which, however, he was led to resign in consequence of his strongly pronounced political tendencies, which made him enter heart and soul into the feeling of hatred of Napoleon, which was at that time agitating the minds of Germans. In accordance with these views, N. entered the Prussian civil service in 1806, and during the three succeeding years he shared in the vicissitudes which befell the government of his chief, Count Hardenberg, after the disastrous battle of Jena, and the consequent pressure of the Napoleonic influence on the management of the state. The opening of the university of Berlin in 1810 was a new era in the life of N., who, with the view of promoting the interests of the new institution, gave a course of lectures on Roman history, which, by making known the results of the new and critical theory which he had applied to the elucidation of obscure historical evidence, established his position as one of the most original and philosophical of modern historians. His appointment, in 1816, to the post of Prussian ambassador at the papal court, where he remained till 1823, gave him an opportunity of testing on the spot the accuracy of his conjectures in regard to many questions of local and social bearing. On his return from Rome, N. took up his residence at Bonn, where, by his admirable lectures and expositions, he contributed very materially to the development of classical and archaeological learning. He was thus employed when the revolution of 1830 roused him from the calm of his literary pursuits. N.'s sensitive nature, unstrung by physical debility, led him to take an exaggerated view of the consequences of this movement, and to anticipate a recurrence of all the horrors of the former French revolution, and the result was to bring about a state of mental depression and bodily prostration, which ended in his death in January 1831. N.'s attainments embraced a more extensive range than

most men are capable of grasping, for he was alike distinguished as a shrewd man of business, an able diplomatist, an accurate scholar, and a man of original genius. He had mastered twenty languages before the age of thirty, while the mass of facts which his tenacious memory retained, and the intuitive sagacity that enabled him to sift true from false historic evidence, and often to supply by felicitous conjecture the link wanting in some imperfect chain of evidence, exhibit the extraordinary scope of his intellect. It is not to be denied, however, that he is often arbitrary and unhistorical in his conjectures, and the stricter sort of sceptical critics, like the late Sir George Cornewall Lewis, even go so far as to regard his effort to construct a continuous Roman history out of such legendary materials as we possess as, on the whole, a failure. Among the many important works with which he enriched the literature of his time, the following are some of the most noteworthy: "*Römische Geschichte*" (3 Bde. Berl. 1811-1832; 2d edit. 1827-1842; 1838; 1853), the first two volumes have been translated by J. C. Hare and C. Thirlwall, and the third by Dr W. Smith and Dr L. Schmitz; "*Grundzüge für die Verfassung Niederlands*" (Berl. 1832); "*Griech. Heroengeschichte*" (Hamburg. 1842), written for his son Marcus; the "*Kleinen historischen und philologischen Schriften*" (2 Bde. Bonn, 1828-1843), contain his introductory lectures on Roman history, and many of the essays which had appeared in the *Transactions* of the Berlin Academy. Besides these, and numerous other essays on philological, historical, and archæological questions, N. co-operated with Bekker and other learned annotators in re-editing "*Scriptores historię Byzantinę*;" he also discovered hitherto unprinted fragments of classical authors, as, for instance, of Cicero's "*Orations*" and portions of Gains, published the "*Inscriptiones Nubienses*" (Rome 1821), and was a constant contributor to the "*Rheinische Museum für Philologie*," and other literary journals and societies of Germany.

**NIE'LO-WORK**, a method of ornamenting metal plates by engraving the surface, and rubbing in a black or colored composition, so as to fill up the incised lines, and give effect to the intaglio picture. It is by no means quite certain when this art was originated; Byzantine works of the 12th c. still exist to attest its early employment. The finest works of this kind belong to the former half of the 15th c., when remarkable excellence in drawing and grouping minute figures in these metal pictures was attained by Maso di Finiguerra, an eminent painter, and student of Ghiberti and Masaccio. In his hands it gave rise to copper-plate engraving (see **ENGRAVING**), and hence much interest attaches to the art of niello-cutting. Genuine specimens of this art are rare, some of those by Finiguerra are very beautiful and effective, the black pigment in the lines giving a pleasing effect to the surface of the metal, which is usually silver. Those of his works best known are some elaborately beautiful pattines wrought by him for the church of San Giovanni at Florence, one of which is in the Uffizia, and some are in various private collections. In the collection of Ornamental Art at South Kensington, there are no less than 17 specimens of this art.

**NIE'MEN** (called by the Germans *Memel*), a river in Prussia, rises a few miles south of the city of Minsk, flows westward to Grodno 180 miles, north and west along the frontiers of the Polish province of Augustowo, and west through East Prussia to the Kurische Hafl. Entire length, 640 miles. It is navigable for large craft at Grodno, 400 miles from its mouth, and is free of ice from March to November. Between Grodno and Kovno there are 55 rapids and shallows, and pilots are therefore required for the navigation of the river. At Winge, 8 miles below Tilsit, the N. divides into two branches, of which the northern, the Russ, reaches the Kurische Hafl by nine months; and the southern, the Gilge, by seven months. The delta is traversed by numerous canals. The N. is of considerable commercial importance. Large barges bring down the produce of Lithuania and of a portion of Poland to Königsberg and Memel. Corn, hemp, flax, hides, and bacon are the principal articles brought from the interior. Its principal affluent is the Vilia on the right.

**NIEPCE DE ST VICTOR**, Claude-Felix-Abel, a French chemist and photographer, was born at Saint Cyr, near Chalons-sur-Saone, 26th July 1805. He served for some time in the army; but having made an important chemical discovery in connection with dyeing, he was permitted to exchange into the municipal guard of

Nierstein  
Niger

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Paris, that he might pursue his scientific studies with more facility. This was in 1846, at which time his attention having been forcibly attracted to the important discoveries in photography which had been made by his uncle Nicéphore Niepce (see PHOTOGRAPHY), he resolved to devote his energies to this subject. He was led, in 1847, to the discovery of methods for obtaining images on glass, coated with albumen, starch, or gelatin, and for reproducing designs by the use of vapor of iodine. His investigations were for a time interrupted by the revolution of 1848, but he soon resumed them, directing his attention more especially to the obtaining of photographic images in colors; and before the close of 1852, he had succeeded in obtaining faithfully colored images of flowers, natural and artificial, colored engravings, gold and silver lace, &c., upon silvered plates which had been sensitised by a chloride of copper. In obtaining these pictures, both photographic printing and the camera were employed; but to his intense disappointment, he found that the colors soon began to fade, and after a time disappeared. This process he named "Heliochrome." His third and most important invention, that of the art of "Heliography," or the production of engraved steel-plates by photography, was first communicated to the Academy of Sciences in May 1853. He does not deserve the credit of having originated the idea; for his uncle, previous to 1839, had communicated an imperfect sketch of a similar invention to M. Arago; and Mr Talbot and others had succeeded by a similar process in obtaining images of simple objects on steel-plates; but to N. belongs the credit of having removed the almost insurmountable manipulative difficulties, and rendered the process of much more general application, thus making it practically serviceable. He afterwards employed himself in improving and perfecting his various discoveries.

In 1855, he published the various memoirs in which he had at different times communicated his three great discoveries to the Academy of Sciences, under the title of "*Recherches Photographiques*," which was followed, in 1856, by "*Traité Pratique de Gravure sur Acier et sur Verre*." He presented to the Academy a number of memoirs on the action of light on a variety of substances, the last being "*Sur l'Action de la Lumière et de l'Électricité*" (February 1860). N.'s scientific studies did not interfere with his military promotion, as he was successively appointed *chef-d'escadron*, and (1854) *commandant* of the Louvre. He died in April 1870.

NIE'RSSTEIN, a market village (pop. 2600) of Hessen-Darmstadt, in the province of Rheln-Hessen, and 9 miles south-south-east of Mayence, gives name to a well-known and highly-prized variety of Rhenish wine, which is produced in the neighborhood.

NIEU WER AMSTEL, a town of the Netherlands, in the province of North Holland, five miles south-by-west from Amsterdam. Pop. 8066. A few miles to the east of it is the village of Ouder Amstel, with about 3000 inhabitants, on the Amstel, one of the smaller mouths of the Rhine, which passes through the city of Amsterdam, and falls into the Zuider Zee.

NIEU'WVELDT MOUNTAINS, a portion of the most northerly of the three ranges of mountains in Cape Colony, which at various distances from the southern coast all run parallel to it. Of these three ranges, the most northern attains the greatest altitude, having an average height of 7000 feet. The portion known as the N. M. extend in lat.  $31^{\circ} 40'$  to  $32^{\circ} 30'$  s., and are intersected by the meridian of  $22^{\circ}$  e. long. From their southern slopes, the Gamka or Lion River draws its head waters; and from their northern, the Gariep or Orange River obtains an important tributary in the upper Zak.

NIEVRE, a central department of France, occupies a portion of the watershed between the Loire and the Seine, and is bounded on the west by the rivers Allier and Loire. Area, 1,684,469 acres; pop. (1872) 889,917. Mountains occupy the eastern border, and extend in a line of heights from south-east to north-west, dividing the department into two great declivities. The soil is generally rocky and sandy, cut up by ramifications, almost always wooded, of the mountains of Morvan. There are several plateaux more or less fertile, a number of hills covered with vines, and the valleys productive in pastures; but the principal wealth of the department consists in its forests and minerals. The Nièvre, whence the name of the department, is an inconsiderable affluent of the Loire from the right. The three chief rivers—the Allier, Loire, and Yonne—are navigable, and the Yonne, which belongs to the sys-

tem of the Seine, is connected with the Loire by a canal leading across the watershed. Of the entire area, 792,000 acres were in 1864 in cultivable land, and more than a third of the whole surface is covered with forests, the timber from which, forming one of the principal sources of wealth, is conveyed by water in great quantities to Paris, &c. About 6,400,000 gallons of wine are made yearly. From the mines of N., iron of good quality is obtained in abundance; lead, copper and silver are also found; and there are coal mines, and quarries of marble and granite. Arrondissements, Nevers, Château-Chalon, Clamecy, and Cosne; capital, Nevers.

**NIFLHEIM** (from the same roots as Lat. *nebula*, cloud, and Eng. *home*), meaning the abode of clouds; was one of the nine separate abodes or homes, of which the old Scandinavians conceived the world as consisting in the beginning of time. It is the kingdom of cold and darkness, and is separated from Muspelsheim, the kingdom of light and heat, by a huge chasm (Ginnungagap, yawning gap). Here flows the spring Hvergelmir, watched by the dragon Nidhigger; this spring sends out twelve ice-rivers, from the drops of which, thawed by sparks from Muspelsheim, sprang the chaotic giant Ymir and the cow Audhumbla. N. was also the abode of Hel (q. v.), the goddess of death, who here received all who died of sickness or old age.

**NIGELLA**, a genus of plants of the natural order *Ranunculaceæ*, having five colored spreading sepals; five or ten small two-lipped petals, with tubular claw; the carpels more or less connected together, many-seeded; the leaves divided into threadlike segments, the flowers solitary at the top of the stem or branches. They are annuals, natives chiefly of the countries near the Mediterranean and the warmer temperate parts of Asia. Some of them, occasionally seen in gardens in Britain, are vulgarly known by the names *Devil-in-a-bush* and *Devil-in-a-mist*. The seeds are aromatic, and somewhat peppery. Those of *N. sativa*, a species common in cornfields in the south of Europe, are supposed to be the **BLACK CUMMIN** of the ancients, and perhaps the **CUMMIN** of the Bible. The seeds of a species of N. are much used by the Afghans for flavoring curries.

**NIGER**, the great river of Western Africa. Its name, according to Dr Barth, is a contracted form of one of the native names, *N-eghirren*, which, as well as all the other names, *Dhiálbá* (*Joliba*), *Máyo*, *I'aa*, *Kudara* (*Qorra*), and *Báki-n-rúwa*, means simply "the river." The principal head-water rises on the slopes of Mount Loma, a peak of the Kong Mountains in a barren, desolate, and treeless region, in lat. 9° 25' n. long. 9° 45' w., about 1600 feet above sea-level. It flows north-east to Timbuktú, where it bends eastward, and after flowing in that direction for about 250 miles, it curves toward the south, and proceeds in a general south-south-east course, until arriving at the head of its delta, in lat. about 5° 30' n., it separates into many branches, and enters the Gulf of Guinea, between the Bights of Benin and Biafra. It is called the Timbri for the first 70 miles of its course, after which it receives the name of the Joliba, or more correctly Dhiálbá; and after passing Timbuktú, it is known principally as the Qorra. Little is known of its course until it reaches Sego (lat. 12° 30' n.), a distance of 350 miles from its source, but from that point it has been explored throughout nearly the whole of its course. From Sego to Timbuktú it flows through a fertile country, producing rice, maize, and vegetables, and abounding in good pasturage. In lat. 14° 10' n. the river separates into two branches; the western is called the Joliba or Mayo, the eastern the Bára-Iaa. These, as they proceed, are known as the White and Black rivers respectively; and they unite after enclosing the island of Jimballa, 220 miles in length, and from 2 to 30 miles in breadth. The river again bifurcates before arriving at Timbuktú, and after passing that town, the two branches, on one of which—the northern—Cahra, the port of Timbuktú is situated, again unite. In the district of union, in the south-west of Timbuktú, the country far and wide is intersected by numberless streams, forming a complicated net-work of water-courses. The river then flows east, sending off many creeks and branches to Bamba; its banks here are low and marshy, and during the rainy season are overflowed. In this region, rice, tobacco, wheat, and even barley are grown. The river then passes the town of Burrum, where it curves to the south-east, and from this point—called from the bend, the *Knee of Burrum*—it bears the name Kwara or Qorra until it reaches the delta. Immediately below Burrum, the N. does not pre-



sent an imposing appearance. Its bed resembles a broad marshy valley, enclosed by ridges of rock or high dunes, thickly overgrown with reeds and sedges, and cut up by numberless streams and creeks. At the ferry of Burri (lat.  $15^{\circ} 55' N.$ ), the breadth of the river is from 800 to 900 yards; and here the whole valley, about ten miles broad, is fruitful, carefully cultivated, and well peopled. Further south, the towns of Gari and Sandu are passed, and here the bed is rocky and the navigation dangerous. At the town of Say, the N., after reaching a breadth of from 2500 to 8000 paces, is narrowed to a width of 1000 paces, flows at the rate of three miles an hour, and is enclosed by rocky banks. From Say to Wara, the course of the N. remains still unknown. From Wara, it flows east-south-east to Rabba; and from this town to its mouth, the course of the river is comparatively well known. In lat. between  $8^{\circ}$  and  $7^{\circ} 30' N.$ , it flows round the eastern shoulder of the Kong Mountains (2000 to 3000 feet high), and here the banks of the N. are extraordinarily beautiful. In lat.  $7^{\circ} 40' N.$ , it receives the Beune from the east. The delta consists of an immense mangrove forest, cut up into islands by the numerous branches (23 in number) of the river. The principal mouths are the Bonny, Mâri, and Nani.

The existence of the N. seems to have been first made known in ancient times by travellers from the southern shores of the Mediterranean, who, crossing the great desert, came upon the upper course of a great river flowing toward the rising sun. This river Herodotus supposed to be a branch of the Egyptian Nile. Pliny speaks of the *Nigris* of Ethiopia, but he also thought that it flowed into the Nile. No definite notion of the river had been formed until it was visited by Mungo Park in July, 1798, when this traveller explored its banks for a distance of 160 miles. See PARK, MUNGO. Caillié explored the river from the town of Jenneé to Timbuktu; and the English expedition of 1832, under Lander and Allen, proved that the Quorra was navigable from Boussa to the sea; information, however, which was obtained at an immense cost of human life from the unhealthiness of the climate. Subsequent expeditions have ended with similar results. In 1854, Dr Barth followed the course of the river from Timbuktu to Say, and much of what is now known about the N. is due to his labors. The entire length of the river is estimated at upwards of 2500 miles.—Barth's "Travels in Central Africa."

**NIGHT-HAWK** (*Chordeiles Virginianus*), a bird of the Goatsucker family (*Caprimulgidae*), very common in America, from the Arctic islands to the West Indies. It is a bird of passage, visiting the north in summer. It is about nine inches in length, and 23 inches in expanse of wing. The gape is destitute of bristles. The tail is slightly forked. The general color is brown, but it is much mottled and marked with white; and there is a white mark on the throat, in shape like the letter V. The N. is seen pursuing its insect prey in the air, chiefly a little before sunset, and before dawn, and attracts attention by its rapid repetition of a sharp impatient cry, which has gained for it the name *Piramidig*. It produces also in its flight a remarkable hollow booming sound, "like blowing into the bung-hole of a barrel," in the moments of its perpendicular descent through the air. Its movements in the air are extremely beautiful and rapid. When fat and plump, as it usually is on its southward migration, it is esteemed for the table, and great numbers are shot.

**NIGHT HERON** (*Nycticorax*), a genus of *Ardeidae* (see HERON), intermediate in form between bitterns and herons, but with shorter and thicker bill than either, and legs shorter than in herons. The COMMON N. H. (*N. Gardani* or *Europæus*) is found in Europe, Asia, Africa, and North America, chiefly in the warmer temperate regions. It is most abundant in America, and is partly a bird of passage. It is a very rare visitant of Britain. Its length, from the tip of the bill to the end of the short tail, is fully two feet. It weighs nearly two pounds. Its plumage is soft, the general color ash-gray, passing into black on the neck and head, and into white on the breast and belly. The back of the head is adorned with three very long white feathers, which hang down on the neck. The nests are built in trees, and in general many together forming a *heronry*. The N. H. feeds chiefly by twilight or at night; and is never seen standing motionless, like herons, but walks about in search of prey, by the sides of ditches, ponds, &c.; its food consisting chiefly of fishes, frogs, and other aquatic animals. Its cry is very loud and hoarse.—Other species of N. H. are found in Africa and Australia.

**NIGHTINGALE**, Florence, famed for her labors in reforming the sanitary con-

dition of the British army, is the daughter of William Shore Nightingale of Embay Park, Hampshire, and Leigh Hurst, Derbyshire, and was born at Florence in 1820. Highly educated, and brilliantly accomplished, she early exhibited an intense devotion to the alleviation of suffering, which, in 1844, led her to give attention to the condition of hospitals. She visited and inspected civil and military hospitals all over Europe; studied with the Sisters of Charity in Paris the system of nursing and management carried out in the hospitals of that city; and, in 1851, went into training as a nurse in the institution of Protestant Deaconesses at Kaiserswerth, on the Rhine. On her return to England, she put into thorough working order the Sanatorium for Governesses in connection with the London institution. Ten years was the term of apprenticeship thus served in preparation for the work of her life. In the spring of 1854, war was declared with Russia, and a British army of 25,000 men sailed to the East. Alma was fought on the 20th of September, and the wounded from the battle were sent down to the hospitals prepared for their reception on the banks of the Bosphorus. These hospitals were soon crowded with sick and wounded, and their unhealthy condition became apparent in a rate of mortality to which the casualties of the fiercest battle were as nothing. In this crisis, Miss N. offered to go out and organise a nursing department at Scutari. The late Lord Herbert, then at the war-office, gladly accepted, and within a week from the date of the offer—viz., on the 1st of October—she departed with her nurses. She arrived at Constantinople on the 4th of November, the eve of Inkermann—the beginning of the terrible winter campaign—in time to receive the wounded from that second battle into wards already filled with 2300 patients. Her devotion to the sufferers can never be forgotten. She has stood twenty hours at a stretch, in order to see them provided with accommodation and all the requisites of their condition. But she saw clearly in the bad sanitary arrangements of the hospitals the causes of their frightful mortality, and her incessant labor was devoted to the removal of these causes, as well as to the mitigation of their effects. In the spring of 1855, while in the Crimea organising the nursing-departments of the camp-hospitals, she was prostrated with fever, the result of unintermitting toil and anxiety; yet she refused to leave her post, and on her recovery remained at Scutari till Turkey was evacuated by the British, July 29, 1856. She, to whom many a soldier owes life and health, had expended her own health in the physical and mental strain to which she had subjected herself. It is known that for years Miss N. has been an invalid. It is not so well known that her sick-room has been the scene of the most arduous and constant labor for the improvement of the health of the soldier. In 1857, she furnished the "commissioners appointed to inquire into the regulations affecting the sanitary condition of the British army" with a paper of written evidence, in which she impresses, with the force and clearness which distinguish her mind, the great lesson of the Crimean War, which she characterises as a sanitary experiment on a colossal scale. Her experience in the Crimea, the results obtained by the labors of the sanitary commission, results accumulated under her own eyes, shewing that the rate of mortality among soldiers could be reduced to one-half of what it was in time of peace at home, turned the attention of Miss N. to the general question of army sanitary reform, and first to that of army hospitals. In 1858, she contributed two papers to the National Association for the Promotion of Social Science, on Hospital Construction and Arrangement, afterwards published, along with her evidence before the commissioners, by J. W. Parker and son. The "Notes on Hospitals," from their clearness of arrangement and minuteness of detail, are most valuable to the architect, the engineer, and the medical officer. In 1858, she published her "Notes on Nursing," a little volume which is already among the treasured textbooks of many a household. At the close of the Crimean War a fund was subscribed for the purpose of enabling her to form an institution for the training of nurses. The interest of the fund amounts to £1400 per annum; and though no separate institution has been formed, it is spent in training a superior order of nurses in connection with St Thomas's and King's College Hospitals. In the year 1863 was issued the Report of the Commission on the Sanitary Condition of the Army in India. The complete Report, with evidence, occupies two folio volumes of nearly 1000 pages each. The second of these huge folios is filled with reports from every station in India, occupied by British and native troops. These reports were sent in manuscript to Miss N., and at page 347 of vol. i. are inserted her observations upon

this immense mass of evidence. In these observations, the facts are brought together in an order, and with an incisive force of statement, which render it one of the most remarkable public papers ever penned. That Report is likely to inaugurate a new era in the government of India; for the views of Miss N. extend not only to the sanitary reform of the British army, but to that of the towns of India. In 1871, Miss N. published "Notes on Lying-in-Institutions, together with a proposal for organising an Institution for training Midwives and Midwifery Nurses." In the May number of "Fraser's Magazine," 1873, she published an article entitled, "A 'Note' of Interrogation," which attracted a good deal of attention, mainly on account of the way she handles religious beliefs and life.

**NIGHTINGALE** (*Philomela*), a genus of birds of the family *Sylviadae*, approaching in character to the *Merulidae*, the young having their first plumage mottled, as in the thrushes, and the legs being longer than in the *fauvettes* and other *Sylviadae*, with which they are commonly classed. The bill is straight, slender, not quite as long as the head; the wings do not much pass beyond the base of the tail; the first quill is very short, the third is the longest; the tail is slightly rounded.—The COMMON N. (*P. luciniae*) is well known as the finest of songsters. It is rather larger than the hedge-sparrow, with about the same proportionate length of wings and tail. It is of a rich brown color above, the rump and tail reddish, the lower parts grayish-white. The sexes are alike. It is a native of many parts of Europe and Asia, and of the north of Africa; and is a bird of passage, extending its summer migrations on the continent of Europe as far north as the south of Sweden, but in Britain it has scarcely ever been seen further north than Yorkshire. It is plentiful in some parts of the south and east of England, but does not extend to the western counties, and never appears in Ireland. It frequents thickets and hedges, and low damp meadows near streams. The extensive market-gardens near London are among its favorite haunts. It feeds very much on caterpillars and other larvae. It arrives in England about the middle of April, the males ten or fourteen days before the females. It is at this season, and before pairing has taken place, that bird-catchers generally procure nightingales for cage-birds, as they then become easily reconciled to confinement, whilst, if taken after pairing, they fret and pine till they die. The N. makes its nest generally on the ground, but sometimes on a low fork of a bush. The nest is loosely constructed of dead leaves, rushes, and stalks of grass, with a lining of fibrous roots. The eggs are four or five in number, of a uniform olive brown. The song of the male ceases to be heard as soon as incubation is over. In captivity, however, it is often continued through a more considerable period. The N. usually begins its song in the evening, and sings with brief intervals throughout the night. The variety, loudness, and richness of its notes are equally extraordinary; and its long quivering strains are full of plaintiveness as well as of passionate ecstasy. The N. has been a favorite from most ancient times, and is often mentioned in the poetry of India and Persia, as well as of Greece and Rome. The loves of the N. and the rose are a fanciful theme in which eastern poets delight. The N. much resembles the robin in manners, and is equally pugnacious. It has been known to breed with the robin in captivity.—There is another and rather larger species of N. in the east of Europe, faintly mottled on the breast.

**NIGHT-JAR.** See **GOATSUCKER**.

**NIGHTMARE** (*Incurbus*, *Ephialtes*) consists in a horrible dream, the terror being inspired by a sense of weight or oppression referred to the pressure of mountains, giants, bags, serpents, upon the breast. It is attributed to acceleration or irregularity of the circulation in the chest or in the brain. It has been traced backwards to plethora, posture, heavy suppers; and forwards as a prognostic of heart disease or hydrothorax. It differs from ordinary dreams in possessing always the same characteristic of fear of some object in contact with the body, in a recognised inability to move or speak while there is a strong desire to do both, and in the presence of a semi-consciousness of the real source of the apprehension. The affection is recorded to have been epidemic; and modern instances have occurred where large communities have been agitated by night panics. A regiment of French soldiers, quartered in a ruined monastery, were awakened, at the same hour in two successive nights, by a black dog leaping on the breast of each. These veterans

warriors, inured to danger, inaccessible to superstition, could not be prevailed upon to make a third trial. Such frightful impressions occur during the day, and during mere somnolency or drowsiness, but more generally at the moment of awakening during the night. The time, the distinct recollection retained of the circumstance, and the bodily perturbation which remained when consciousness was re-established, all conspired to convert these visions into the objective hobgoblins, the omens and supernatural revelations of past ages; and which still linger as matter of belief where the temperament or situation of the individual resemble those of our ancestors. In a very large number of instances such dreams represent, or are continuations of, the previous waking thoughts and emotions. They are so far voluntary that indigestible food or excess may induce them. Faselli, for artistic purposes, created "chimeras dire" in sleep by supping on pork chops.

**NIGHTSHADE**, the English name of certain plants of the natural order *Solanaceæ* (q. v.), possessing the narcotic properties frequently developed in that order. Among them are some species of *Solanum* (q. v.), particularly the **COMMON N.**, or **BLACK N.** (*S. nigrum*), an annual or biennial, with erect angular stem, ovate, serrate-dentate leaves, drooping lateral umbels of white flowers, and globose black berries; a frequent weed in waste places in England and in most parts of the world. Few plants are more widely diffused. It is only slightly narcotic. The leaves, in a fresh state, are said to be injurious to animals which eat them, but seem to lose almost all narcotic property by boiling, and are used as spinach, particularly in warm climates. The berries, although generally dreaded or suspected, may also, it is said, be eaten, at least in moderate quantity without danger. They contain, however, the alkaloid *Solanine*, found also in the shoots of the potato.—For **WOODY N.**, see **BITTERSWEET**. For **DEADLY N.**, see **BELLADONNA**. For **ENCHANTER'S N.**, see **CICUTA**.

**NIJMEGEN**, **NJMEGUEN**, the *Noctomagus* of the Romans (*magus* or *magen* being a Celtic word for fixed dwelling), called by Tacitus *Batarorum oppidum*, in the middle ages *Ymaga*, is the principal city of the district of Nijmegen, or the Betuwe, in the Netherlands province of Gelderland. Pop. 23,093, of whom three-fourths are Roman Catholic. It is pleasantly situated, 9 miles south of Arnhem, on several little hills, on the left bank of the Waal. Several of the streets are steep and narrow, passing up the Hoenderberg (*Hunnerberg*, or Hill of the Huns), on which the Romans had a permanent camp, in order to keep in subjection the country of the Batavians, which lay between the Rhine and the Waal; others are broad and well built. On a height stood, till 1797, when it was demolished by the French, the Castle of Valkenburg, said to have been built by Julius Cæsar. Here Charlemagne built a palace, and made the castle his residence. The site is now planted with trees, and forms a pleasant public walk overlooking the river and quay. On the brow of the hill there is a little sixteen-sided chapel or baptistery, which some think was originally a heathen temple of the Batavians, and converted into a Christian church by Pope Leo III. in 799. On another eminence, where the chateau of the Duke of Alva once stood, is a modern tower called Belvidere, from the summit of which there is an extensive view, including the rivers which branch off at the delta of the Rhine—viz., the Rhine, the Waal, and the Yssel, with the Maas flowing in the south. N. is strongly fortified and well garrisoned. The town-house, founded in 1554, is beautifully and antiquesly fitted up within, and externally ornamented by several statues of emperors and kings of the Romans. St Stephen's, or the Great Church, standing on the highest part of the city, is a handsome Gothic edifice in the form of a Greek cross, and before the Reformation contained 80 altars. N. is a large market for cattle and agricultural produce, especially grain. Beer is extensively brewed, Eau de Cologne distilled, and there are factories for spinning and weaving linen, cotton, and silk.

N. is celebrated for the great peace congress of the European powers, which was held here, and, 10th August 1678, concluded a treaty between Spain and France; on the 17th September, between France and the United Netherlands; and between the German Empire and France, and the same empire and Sweden, 5th February 1679.

**NIJXI-NOVGORO'D**, an important government in the east of Great Russia, between the governments of Vladimir on the west and Kazan and Simbirsk on the east. Area (according to the "Almanach de Gotha"), 19,390 square miles; pop. (1870) 1,271,564. The surface is divided into two distinct portions by the Volga with

its tributary the Oka. On the left, the northern bank of the river, the surface is flat; on the right bank it is hilly. As the soil is not very fertile, and there are few rich meadow-lands, neither agriculture nor cattle-breeding is pursued extensively. The inhabitants are principally engaged in manufactures. The chief rivers are the Volga, Oka, and their numerous tributaries. There is communication by water with 24 governments, and with the Baltic, the White, and the Caspian Seas. The northern districts of the government abound in forests, and here wooden utensils and tools are manufactured for the adjoining governments. There are several large iron-works, and the town of Gorbatof is the Sheffield of its district. Leather, especially that variety called Russian leather, is largely manufactured, and sheep and lamb skin dressing is a staple employment. On the right bank of the Oka are several ship-building and dock-yards. The towns and villages are filled with an industrious and thriving manufacturing population. Capital, Nijni-Novgorod (q. v.).

**NIJNI-NOVGOROD** (Lower Novgorod), a famous commercial and manufacturing town in the east of Great Russia, capital of the government of the same name, is situated at the confluence of the Oka with the Volga, in lat. 56° 20' n., long. 44° 1' e., 715 miles east-south-east of St Petersburg, with which, since 1862, it has been connected by railway. The fortified portion of the town occupies a hill overlooking the Volga, and is surrounded with a wall. It contains the Kremlin or citadel, two cathedrals, the palaces of the governors, and an obelisk 76 feet high, in memory of Minin and Pojarsky, the deliverers of Moscow. The town possesses several ropewalks, dock-yards, ironworks for building steamers, three steel-cutlery works, &c. The commercial portion of N. is situated on a projecting point of land which forms the right bank of the Volga and the left bank of the Oka. It has an area of 350 acres, consists of 60 ranges of brick buildings, is surrounded by a canal, and contains 2520 shops, a Russian cathedral, an Armenian church, a mosque, a temporary branch of the state bank, counting-house, post-office, &c. Here the great annual fair is held; but the commerce of N. is not confined to this area. On the further side of the canal are ranges of wooden erections, containing 5000 shops, exclusive of taverns, baths, and other public establishments. The fair, which lasts over a month, is officially opened on the 27th July; but owing to the tardy arrival of the Chinese and Siberian goods, a day or two generally intervenes before it actually commences. With the opening of the fair, the town becomes rapidly filled with merchants from every country and climate—Europeans, Bokharians, Khivans, Kirghizes, Tartars, Armenians, Persians, and even Chinese. The merchants are required to pay nothing in the way of taxes during their stay, except, indeed, the rent of the shops they occupy, and every one has the privilege of trading freely without any exaction from the crown. The fair of N. is of great commercial importance, especially with respect to the eastern and central provinces. The value of goods disposed of during the fair is great, and seems to be continually on the increase. In 1697, the value of the goods sold was £14,000; in 1741, £81,000; in 1790, £5,000,000; in 1857, £14,000,000; in 1863, £16,760,000; in 1874 it was £23,543,500. The goods may be divided into three groups: 1. *Russian raw and manufactured goods*, including cottons, linens, woollens, furs, metals, corn, &c. 2. *European and colonial goods*, including manufactured goods, wines, &c. 3. *Asiatic goods*: tea, silk, cotton, &c. The total value of goods brought to the fair for sale, was in 1874 estimated at £25,743,000. For the convenience of buyers and sellers, an enormous market-house has been built, as also a cathedral, a mosque, an Armenian church, and 60 blocks of buildings for booths, containing 2530 store-rooms; besides 3400 temporary booths of wood, which are taken down after the fair.

N., an ancient town, was founded in 1221 by Prince Yuri Vsevolodovich as a stronghold against the invasions of the Bulgarians and the Mordva. It was devastated on several occasions by the Tartars; and in 1612, during the civil dissensions in Russia, when it was on the point of falling a prey to Poland, Minin, the famous butcher of N., collected an armed force here, which, under Prince Pojarsky, drove the invaders from the capital. See Moscow. The prosperity of this town dates from the year 1817, when the great fair was removed to N. from Makarief, on account of the destructive fire which broke out in the latter place, and destroyed the greater portion of the stores and magazines. The normal population of the town is (1867) 42,742; but it is increased to upwards of 200,000 during the fair. N., so

favorably situated for purposes of commerce, carries on a brisk trade during the whole season of navigation, and especially in spring during full water.

**NIJNI-TAGILSK**, a town of Russia, in the government of Perm, situated on the river Tagil, amid the Ural Mountains, 180 miles east of the city of Perm. It is one of the most important mining towns in Russia, or in the world. The soil in the immediate vicinity is everywhere rich in iron, copper, gold, and platina; not far off is the famous magnetic mountain Blagodät, 1422 feet high. Akimf Demidoff (q. v.) established the first foundry here in 1725. The yield both of iron and copper is immensely large. Pop. 35,000.

**NIKOLAE'V**, a town of South Russia, in the government of Kherson, and 40 miles north-west of the town of that name, stands 25 miles above the mouth of the Bug, and at the confluence of that river with the Ingul. It was founded in 1790, and its situation was found so convenient for ship-building purposes, that it soon became the centre of the naval administration of the Black Sea. It has broad straight streets, contains several barracks, a cathedral, schools for pilots, hospitals, an observatory, and an arsenal. In the first half of the present century, about 10,000 men were employed at N. in ship-building and other naval operations. Since the opening of the railway system, by which it has connection with Moscow, &c., the population and trade has greatly increased. Pop. (1867) 67,971.

**NIKOLAE'VSK**, chief town of the Amur territory, in Eastern Siberia, situated on a well-wooded plateau on the left bank of the Amur, and 22 miles from its mouth, in lat. 53° 15' n., long. 140° 35' e., 6750 miles east from St Petersburg. It contains a wooden church with one large and five smaller steeples, the town residence of the governor, and the storehouse of the Amur Company. The approaches to the town are defended by four batteries, which command the upper as well as the lower part of the river. The Amur is here a mile and a quarter broad, but the landing-place is available only for small craft, all large vessels being compelled to lie in mid-stream. It was founded in 1851; in 1855, it consisted of 150 houses, and in 1863, of 249 houses. It is the seat of naval and civil administration, and the centre of the commercial activity of the district. Goods from the interior of Siberia and China are brought hither and shipped in foreign (chiefly American) vessels; and Siberian tradesmen now receive and despatch their goods by sea, as the land route formerly pursued was both tedious and expensive. Rich and extensive forests clothe the banks of the river, and the abundant pastures offer facilities for cattle-breeding. The chief hindrance to the rapid improvement of the settlement is a want of hands and capital. A line of telegraph already extends from St Petersburg to beyond Irkutsk, and is in process of extension to Nikolaevsk. Mean temperature throughout the year, 39° 42'. Pop. (1867) 5314.

**NIKOLSBURG**, or **MI'kulov**, a town of Austria, in the south of Moravia, 27 miles south of Brunn, lies at the foot of the Pollaver Hills, famous for their rich red wines. The town belongs to the princely family of Dietrichstein. It has several steam-mills, and cotton and silk factories. In the middle of the town, upon a rock, stands the Castle of the Dietrichsteins, with a library of 20,000 volumes, and a vat in the cellars capable of containing 2000 elmers (more than 30,000 gallons). Pop. (1869) 7173, of whom more than a half are Jews.

**NIKOPOL**, a thriving town of Southern Russia, in the government of Ekaterinodar, on the right bank of the Dnieper, about 200 miles from its mouth, in lat. 47° 23' n. N. is the centre of an extensive agricultural district, the produce of which is here shipped to Odessa. Between N. and the port of Odessa, there is regular communication by steam-boat. The natural advantages of N. promise to make it one of the principal commercial centres on the Dnieper. Pop. (1867) 8783.

**NILE** (*Nilus*), called by the Egyptians *Hapi Mu* (the genius of the waters), and by the Hebrews *Shor* (the black), the River of North-eastern Africa formed by the union of the Bahr-el-Ablud (the White or True Nile) and the Bahr-el-Azrek (Blue Nile). Captains Speke and Grant discovered that the first of these, the true Nile, flowed out of the lake Victoria Nyanza, which extends from about lat. 0° 20' n., to 2° 30' s., and from long. 31° 40' to 35° e., and is 8800 feet above the level of the sea; and the river Shimiya, the largest tributary of this lake, flowing into its southern ex-

temity, must now be regarded as the most southerly source of the Nile. The second, the Blue Nile, has its source in Abyssinia, in lat.  $10^{\circ} 59'$  n. and long.  $36^{\circ} 55'$  e.

The White Nile, from its outfall from the Victoria Nyanza at the "Kipou Falls," lat.  $0^{\circ} 20'$  n., long.  $33^{\circ} 30'$  e., flows north-west and west for about 230 miles, till it enters the lake Albert Nyanza, within 30 miles of its northern extremity, where the river again emerges. On issuing from the Victoria Nyanza, the Nile rushes down due north like a mountain torrent, running off at last into long flats, and expanding so as to form what is called Ibrahim Pasha Lake. In this part of its course the river is navigable, and continues to be so until it reaches the Karuma Falls. From these falls to the Murchison Falls (120 feet in height), near the Albert Nyanza, the river forms a series of rapids. Between the two Nyanzas the Nile is known as the Victoria Nile, or Somerset River.

After leaving the Albert Nyanza, the Nile begins its northward course to the Mediterranean, and has no further lake expansion. Between the Albert Nyanza and Gondokoro (Ismaïlia), in  $4^{\circ} 55'$  n. lat., and  $31^{\circ} 51'$  e. long., 1500 feet above the sea, the Nile River descends several hundred feet in a series of rapids and cataracts. For about 500 miles after Gondokoro, the Nile flows very tortuously, first in a north-westerly and then in a north-easterly direction, and is joined, in about lat.  $9^{\circ} 15'$  n., long.  $30^{\circ}$  e., by its first great affluent, the Bahr-el-Gazal, which joins the Nile from the west with hardly any perceptible current. The second tributary is the Ghazie River, about one-third the volume of the Nile at its point of junction, long.  $31^{\circ}$  e. From the Bahr-el-Gazal the Nile flows in a due easterly direction for about 80 miles, then south for 30 miles, when it is joined by its third tributary, the Sobat River, from the east. The Sobat is full and navigable. Between this and the town of Khartoum, a distance of 460 miles, the Nile runs in a northerly direction, with a width of from one to two miles, and is joined by several streams from the east side.

Khartoum, the capital of Nubia, is situated at the confluence of the Bahr-el-Azrek (Blue Nile) and the Bahr-el-Abiad (White Nile), 1183 feet above the sea-level, in lat.  $15^{\circ} 35'$  n. long.,  $32^{\circ} 30'$  e. The Bahr-el-Azrek, long supposed to be the main branch of the True Nile, is formed by the junction of the Abai and the Blue River. The Abai has its source in Abyssinia, 50 miles from Lake Dembeni, which it enters from the south-west; emerging on the south-east of the lake, it flows for about 90 miles in that direction, when it describes a semicircle round the peninsula of Godjam, and continues north-westerly for about 150 miles. It is here joined by the Blue River from the south, and from this point the Blue Nile flows north-west to Khartoum, receiving from the east two large rivers running nearly parallel to each other, the Dender and the Rahad or Shimfa. From Khartoum, the united stream flows north for about 60 miles, passing the town of Halfala and the ruins of Meroë to the first cataract, and thence north-east past Shendy (q. v.) to its junction with the Atbara, which enters the Nile at El Damer, lat.  $17^{\circ} 45'$  n., long.,  $84^{\circ}$  e.

The Atbara, also called Bahr-el-Aswad, or Black River, because it carries down with it the greatest amount of the black mud and silt which manures and fertilises Egypt, is the last tributary received by the Nile. The Goang seems to be the direct source of the Atbara. It rises in the heights to the north of Lake Dembeni. About 150 miles from its source it receives the Basalam River, and about 30 miles further on, the Takazze or Setit River, both from the east. The Takazze has a far greater volume of water than either of the preceding rivers. It rises in the Samen Mountains, round which it flows first easterly, then north, till in about lat.  $13^{\circ} 30'$  n., long.  $38^{\circ} 50'$  e. it turns north-west, and then almost due west, joining the Atbara at right angles. It has many tributaries.

From its junction with the Atbara, the Nile continues to flow northerly through the populous and fertile district of Berber, full of villages, and then enters the desert. Turning westwards, in lat.  $19^{\circ}$  n., it forms the large island of Mograt, and makes a curve to the south-westward known as the "great bend," in which there are two cataracts. Entering Nubia, the Nile resumes its north-westerly course, with narrow strips of cultivated land on each bank. Here it forms another cataract, and bends round to the north-east with a fifth cataract, in lat.  $21^{\circ} 40'$  n. After this the valley of the Nile narrows, and at Assouan, in lat.  $24^{\circ} 10'$  n., it forms the last cataract in descending.

From Assuan to the sea, the average fall of the Nile is two inches to a mile, and its mean velocity about three miles an hour. It waters and fertilises the whole length of the land of Egypt. The delta of the Nile extends from lat.  $30^{\circ} 10' N.$  to  $31^{\circ} 30' N.$ , and has a base on the Mediterranean of about 150 miles. In it the Nile spreads out into numerous streams, the two principal being those of Rosetta and Damietta. The total length of the Nile, from its exit from the lake to the sea, is about 3300 miles, measured along its course, or 2200 miles direct distance.

A feature peculiar to the river of Egypt is, that from its junction with the Atbara to its mouth, a distance of upwards of 1500 miles, it receives no affluent whatever, and yet it is able to contend with the burning sun, and scarcely less burning sands of Nubia. With the ancient Egyptians the river was held sacred: the god Nilus was one of the lesser divinities. Its annual overflow is one of the greatest marvels in the physical geography of the globe, for it has risen to within a few hours of the same time, and to within a few inches of the same height, year after year for unknown ages. At Khartoum it begins to increase early in April, but in Lower Egypt the inundation usually begins about the 25th of June, and attains its height in three months. It remains stationary about twelve days, and then subsides. The cultivable soil of Egypt is wholly dependent on the rise of the Nile, and its failure causes a dearth; for virtually, the country has no rain. Continuous south wind brings a good, and north wind a bad year. During a good inundation, the rise is about 40 feet on the Tropic of Capricorn, 36 feet at Thebes, and 4 feet at the Damietta and Rosetta mouths in the Delta. If at Cairo the rise is only 18 or 20 feet, there is a scarcity; up to 24 feet, a deficiency; 26 to 27 feet is good: more than that causes a flood, and fosters plague and murrain. During the inundation the whole valley is covered with water, from which the villages rise like islands, protected by dykes. Of late years the overflow has been greater than the average of many centuries. The rise and fall of the trunk stream of the lower Nile is owing to the periodicity of the rains on the mountains of Abyssinia and in the basin of Lake Nyanza, where on the equator it rains more or less all the year round, most copiously during the equinoxes. The banks of the Nile swarm with birds, among which are vultures, cormorants, geese, pelicans, quails, and the white ibis; and its sweet, soft waters teem with fish. The average amount of alluvium brought down by the river is estimated at a deposit of  $4\frac{1}{2}$  inches in a century—by some, it is made as high as 6 inches; the greater part of it is brought down by the Atbara.

The question of the source of the Nile is at once the oldest and the most recent of geography. That the sources of a river, at whose mouth one of the earliest and most civilised peoples was established, should have been so long veiled in obscurity, is unparalleled in geographical research. The want of success in exploring the upper basin of the Nile may be attributed to the great length of the river, to the difficulties which beset the traveller in the physical nature of the countries he must pass through, the climate, and the jealousy, ignorance, and barbarism of the native tribes. This problem of centuries may now be regarded as satisfactorily solved; for the question whether there may not yet be found important feeders of the White Nile carrying back its source to a still greater distance in the interior, is practically excluded by Stanley's exploration of the Lualaba or Congo basin. The journeys of Krapf and Rebmann to the foot of Kilimandjaro and the other snowy mountains in the east of Africa, believed by them to be the ancient "Mountains of the Moon," and the explorations of the White Nile, pointed to the conclusion that it was among these mountains that the sources of the great river would ultimately be discovered.

There was, however, another theory. Rumors gathered from the natives pointed to lakes in the regions south of the equator, as the true sources of the Nile. To explore this country, the distinguished traveller Captain Richard Burton, accompanied by Captain Speke, started from the Zanzibar coast in 1857. Their enterprise was so far successful that they discovered Lake Tanganyika, in lat.  $5^{\circ} S.$ , long.  $36^{\circ} E.$ , and a large crescent-shaped mass of mountains, overhanging the northern half of the lake and 10,000 feet high, considered by Captain Speke to be the true Mountains of the Moon. On the shores of Lake Tanganyika, Burton was laid up by illness, and his companion, after surveying the northern portion of the lake, left him there to recruit his health, while he (Speke) proceeded northwards to discover another huge "Nyanza" or lake, of the existence of which he was informed by the natives. This he accomplished on the 3d of August 1858, when he discovered the southern end of the Vic-



Nilometer  
Nimeguen

590

toria Nyanza (q. v.). In his journal he says of this immense sheet of water: "I no longer felt any doubt that the lake at my feet gave birth to that interesting river, the source of which has been the subject of so much speculation, and the object of so many explorers."

In 1861, Captain Speke, taking with him Captain Grant, returned to the lake region. The expedition approached the Victoria Nyanza again from the coast of Zanzibar; and the first place from which they obtained a view of it, during the second expedition, was the town of Mashonde on its western side. Thence they pursued their way along the shore northwards. Crossing the equator, they reached streams which are said to flow out of the lake, and further on, in the centre of its northern coast, what they considered to be the parent stream of the Nile, 150 yards in breadth, flowing over rocks of an igneous character, and forming falls 15 feet high, which Captain Speke christened the "Ripon Falls," in honor of the president of the Royal Geographical Society at the time of his starting on the expedition.

In the kingdom of Karagwé, Captain Speke found a very superior negro race, much better disposed to strangers than any of the tribes he had formerly passed through. The country occupied by this race, and that of Uganda, stretches along the Nyanza, and covers half of its western and northern shores, the Uganda being bounded on the east by the main stream of the Nile. North of it lies the kingdom of Unyoro, where the dialects belonging to the language of South Africa, and which up to this point are used by the various tribes, suddenly cease, and give place to those of the language of North Africa.

At Gondokoro, Speke and Grant were met by Mr (now Sir Samuel) Baker, who had come from Cairo to their relief. Baker, accompanied by his heroic wife, pushed still southwards, and had the happiness of discovering, in 1864, another great lake, which he called the Albert Nyanza. In 1869, he undertook a second great expedition, of a military character, at the expense of the Pasha of Egypt, to suppress slavery in the upper regions of the Nile; and has reduced under the sway of that ruler the whole valley of the river as far as the Victoria Nyanza. Sir Samuel returned in September 1873.

Meanwhile, Dr Livingstone had been working for many years, from another quarter, at the solution of the great African problem—the true source of the Nile. In 1866, he began the great journey from which he was destined never to return. Starting from the Rovuma River, in the far south, he passed round the south end of Lake Nyassa, proceeded northward, exploring the lakes Bangweolo and Moero; and in 1869 reached Lake Tanganyika, now known to send its outflow towards the Congo, but which he sought in vain to connect with the Victoria Nyanza. In 1871, he was found by Mr Stanley at Ujiji, on Lake Tanganyika, and it was then his opinion that neither Tanganyika, nor the Albert Nyanza, nor the Victoria Nyanza was the true source of the Nile, nor any of the feeders of these lakes; but that it was to be sought in a basin lying westward of them, through which flow three large rivers, all called Lualaba, and which unite to form another great lake, which he called Lincoln. Out of this a river runs northward, which he conceived to be the main branch of the Nile. Geographers at home generally believed that Livingstone was mistaken, and had struck instead upon the source of the Congo; but the death of the great traveller before the completion of his explorations left the problem unsolved. It was not until Mr Stanley in 1876-7 followed the course of the Lualaba to its mouth that this stream was definitely proved to be identical with the Congo. Mr Stanley's explorations in 1873, ere he struck the Lualaba, have given us more accurate information as to the size and shape of the Victoria Nyanza (see NYANZA) and as to its affluent the Shimyia.

NILOMETER (the measurer of the Nile), the name of two buildings existing in Egypt, one in the island of Rhoda, opposite to Cairo, the other at Elephantine, close to Assouan, in 24° 5' 23" n. lat. The first consists of a square well, in which is placed a graduated pillar of marble, and is called a *mekkas* or measure; the pillar contains 24 *deukhs* or cubits, each of which measure 21·336 inches, or according to Greaves, 1·624 feet, and contains 24 digits; but in its present state, it does not appear to have been intended to mark a rise of more than 16 cubits. This pillar is exceedingly slender. The building formerly had a dome, bearing a Coptic inscription, dated 847 A.D., and is said to have been erected by the Calif Maanun, or his successor Wathek Billali. The first-mentioned monarch is said to have erected another nilometer at the village of Baubenouda, in the Sued, and to have repaired an old

one at Kkhmin. The Calif El Motawukkel built the present one. The mode of calculating the increase at the nilometer is rather complex, and to a certain extent arbitrary, political and financial reasons rendering the process a mystery even to the natives. At the present day the Nile is supposed to have risen to 18 cubits when the canals are cut; this is the height of the lowest inundation; 19 cubits are considered tolerable, 20 excellent, 21 adequate, and 22 complete, 24 are ruinous. In the time of Edrisi, however, 16 cubits were considered sufficient. The object of these nilometers was to measure the amount of taxation to be imposed on the country. The nilometer at Cairo is, however, much more recent than that existing at Elephantine, which consists of a staircase between two walls descending to the Nile. One of these walls has engraved on it a series of lines at proper intervals marking the different elevations to which the river rose under the Cæsars. The cubits here are divided into 14ths or double digits, and measure 1 foot 8·625 inches. This nilometer is described by Strabo. The probability is, that many nilometers existed in the days of the Pharaohs, probably one in each city. In the days of Moeris, 8 cubits were sufficient, but 15 or 16 were required in the time of Herodotus, 466 B.C., and this was the mean under the Romans. According to Pliny, if the inundation did not exceed 12 cubits it produced a famine, 13 starved the country, 14 rejoiced it, 15 was safety, and 16 delight, and this number is symbolically represented by the number of children playing round the river god on statues of the Roman period. The oldest nilometer appears to have been erected at Memphis, and it was transferred by Constantine to a church in the vicinity of the Serapeum; but Julian sent it back to this temple, where it remained till its destruction by Theodosius. At the present day, the rise is watched for with anxiety, and proclaimed by four criers.—Herodotus, II. 13; Strabo, lib. xvii.; Wilkinson, "Topogr. of Thebes," pp. 311–317. Hekekyan Bey, "Siriadic Monuments" (Lon. 1863), p. 145.

NIMBUS, in Art, especially in Sacred Art, is the name given to the disc or halo which encircles the head of the sacred personage who is represented. Its use is almost universal in those religions of which we possess any artistic remains—the Indian, the Egyptian, the Etruscan, the Greek, and the Roman. In the Hebrew scriptures, we trace, in the absence of representations, the same symbolised idea in the light which shone upon the face of Moses at his return from Sinai (Exod. xxxiv. 29–35), and in the light with which the Lord is clothed as with a garment, Ps. ciii. 1, Vulg. (civ. 1, math. vers.); and in the New Testament in the transfiguration of our Lord (Luke ix. 31), and in the "crowns" of the just, to which allusion is so often made (3 Tim. iv. 8; 1 Peter v. 4; Apoc. iv. 4). Nevertheless, the nimbus, strictly so called, is comparatively recent in Christian art, appearing first towards the end of the 5th century. Later in Christian art, it became almost a necessary appendage of all representations of God or of the saints. Its ordinary form is the circular or semicircular; a form, indeed, in which later symbolists discover an emblem of perfection, and of eternity; but the nimbus of the Eternal Father is often in the form of a triangle, and that of the Trinity an emanation of light, the rays of which form the three arms of a cross. The nimbus of the Virgin is sometimes a simple ring, and sometimes a crown or diadem; occasionally it is encircled by an ornamental border, on which twelve stars are sometimes represented. Her nimbus, as well as that of the Divine Persons, is commonly of gold; but that of the Virgin Mary is occasionally in colors, as blue, red, purple, or white. The nimbus of the saints is ordinarily the semicircle or lunula. Dedron mentions the curious instance of a picture of the traitor Judas with a black nimbus! In later art, the nimbus became lighter and more aerial, melting, as it were, into the picture; and in Raphael's saints it occasionally fades into the very faintest indication of a golden tinge around the head. In connection with the nimbus may also be mentioned two analogous forms—the *Aureole* and the *Glory*. The former is an illumination surrounding, not the head only, but the entire figure. If the figure be upright, the aureole is commonly oval, when it is called the *veronica plectis*, and is supposed to contain an allusion to the *ichthys*. With a seated figure it becomes circular, and is occasionally divided by radiating hands, in the form of a wheel; sometimes it takes a quatrefoil form. It is commonly of gold, but occasionally also in colors. The *Glory* is a combination of the nimbus and the aureole, and is chiefly seen in Byzantine pictures, and those of the early South German school.

NIMEGUEN. See NIMEGEN.

Nîmes  
Nînon

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**NÎMES** (anc. *Nemausus*), a town of France, capital of the department of Gard, stands in a fertile plain surrounded by vine-clad hills, 80 miles north-east of Montpellier, with which it is connected by railway. It consists of the town proper (ill built and dirty), and of three handsome suburbs. In the vicinity are the beautiful remains of the Roman aqueduct called the *Pont du Gard*. The chief of the modern edifices are the *Palais-de-Justice*, the theatre, and the hospitals. The *Grande Place* is embellished with one of the most magnificent fountains in France. N. contains numerous and variously-constituted educational institutions, an important public library, Maria Theresa's Museum (in the *Maison Carrée*), a museum of natural history, &c. It is the general entrepôt for the silks produced in the south of France, and its manufactures are principally silk and cotton fabrics. More than 10,000 looms are constantly in operation in the city, and about 6000 in the immediate vicinity. Shawls, handkerchiefs, lace, brandy, wines, &c., are made. Within the town are numerous and beautiful Roman remains, the chief of which are the amphitheatre; the *Maison Carrée* (Square House), a fine specimen of Corinthian architecture; a temple and fountain consecrated to Diana; *La Tour Magne* (Great Tower); the baths, and two Roman gates. See Menard's "Histoire des Antiquités de la Ville du N. et de ses Environs" (1838). Pop. (1872) 65,448.

Previously to the Roman invasion, N.—which is supposed to have been founded by a colony from Massilia (Marseille)—was the chief city of the Volcæ Arecomici. It flourished under the Romans, and was one of the Great cities of Gaul. It surrendered to the rule of the Visigoths between 465 and 535, and afterwards to that of the Franks. Subsequently, it became a possession of Aragon; but was finally restored to France in 1259 by the treaty of Corbeil. The inhabitants adopted Calvinism in the 16th c., and on many occasions suffered severely for their religious principles. In 1791 and 1815, bloody religious and political reactions took place here.

**NÎMROD.** See **BABYLON**.

**NÎNEVEH**, or **NÎNUS**, a very ancient and famous city, the capital of the great Assyrian empire, said in Scripture (Gen. x. 11) to have been founded by Ninus or Nimrod. It was situated on the east bank of the Tigris, opposite to the present Mosul. According to the accounts of the classic writers, the city was of vast extent, 480 stadia, or more than 60 miles in circumference. Its walls were 100 feet high, broad enough for three chariots, and furnished with 1500 towers, each 200 feet in height. In the "Book of Jonah" it is described as an "exceeding great city of three days' journey," and one "wherein are more than sixscore thousand persons that cannot discern between their right hand and their left hand" (children or infants are probably meant). After having been for many centuries the seat of empire, it was taken after a siege of several years and destroyed by the united armies of the Medes under Cyaxares, and the Babylonians under Nabopolassar, about 625 B.C. When Herodotus, not quite 200 years afterwards, and Xenophon visited the spot, there remained only ruins. Tradition continued to point pretty accurately to the site of N.; but it is only of late years that actual explorations have been made. For an account of these, see **ASSYRIA**.

**NINGPO**, a department in the province of Chekiang, China, comprising the city of that name, the Chusan group of islands, and the cities of Tsikie, Fungwa, Chin-hai, and Telangahan. The port of N. is situated at the confluence of two small streams, in lat. 29° 59' n., long. 121° 22' e., 12 miles from the sea, on an alluvial flat of extreme fertility, intersected by a network of rivulets and canals. Its walls are five miles in circumference, about 25 feet high, 22 feet wide at the base, and 15 at the top, with six double gates. As is the case with all the cities in this part of China, N. is permeated by canals communicating with a moat nearly surrounding the walls, and with the adjacent country. In one part of the city they expand into basins, and receive the name of lakes—the Sun Lake and Moon Lake. In the former, is an island devoted to temples, and accessible by bridges. These bridges—good specimens of those aerial stone edifices which adorn this part of China—are required to sustain little more than their own weight, as the roads here are all mere footpaths, and no wheeled vehicles are found. One of the rivers is crossed by a bridge of boats, 200 yards long. The entire city is well paved; the streets are wider than those of most Chinese cities, and the display of shops is indicative of wealth and luxury. Nowhere, save at Haichuan, are such extensive and beautiful

temples to be found. The most elegant and costly of these is dedicated to the Queen of Heaven; the goddess being the daughter of a Fuhkien fisherman, the people of that maritime province are her more special votaries. Elaborate stone sculpture, exquisitely fine wood carving, and a profusion of gilt and tinsel, shew that no expense has been spared to honor the popular goddess.

The centre of the city is ornamented with an elegant seven-storied hexagonal tower—the heaven-bestowed pagoda, 160 feet in height. A spiral flight of steps within the walls of the tower lead to the summit, from which the gazer beholds a splendid scene; innumerable villages dot the plain, which is reticulated by silvery water-courses, replete with evidence of successful commerce and agriculture. The population of the city is about 300,000; that of the plain, about 2,000,000. On many of the hills which environ these cities, green tea is successfully cultivated; while the mulberry, the tallow-tree, and numerous other stimulants of industry abound. Two crops of rice are procured annually from the fields; while the fisheries of the rivers and adjacent coast give employment to a numerous class of the population. Ice-houses close to the river give the banks a picturesque appearance; the ice is used for curing fish. N. has an extensive coasting trade; but no considerable foreign trade has been developed, owing mainly to portrages on the inland water-communications and to the proximity of Shanghai, where no such obstructions exist. The district city of Chihai, at the mouth of the Ningpo River, is also a port. A walled town, containing about 30,000 inhabitants, 10 miles to the east of Chihai, is Kingtang, the nearest of the Chusan archipelago. Tinghai, is the district city of the island of Chusan, which is 20 miles long, from 6 to 10 wide, and 51 in circumference. It is mountainous, with fertile valleys in a high state of cultivation. It has an excellent harbor. Tinghai was garrisoned several years by Her Majesty's forces from 1841, and was again temporarily occupied by the allied forces in 1860.—Dr Macgowan's "Localities."

NINIAN, St, the apostle of the Picts, lived in the latter half of the 4th and the beginning of the 5th century. Whether Christianity had been introduced among the Picts before the time of N., has been a subject of controversy; but although the details of the legendary account are uncertain, it seems, beyond all question, that some Christians were to be found, at least among the Southern Picts, in what is now known as the Lowlands of Scotland, from the end of the 2d century. Nevertheless, either their number was originally very small, or the rising church had fallen away under adverse circumstances; and it is certain that when N. appeared among them, the Picts were in the main a pagan people. He was a Briton, and of noble birth; but had been educated at Rome, and there ordained a bishop. The exact time of his preaching in Scotland is unknown. His labors appear to have commenced in Cumbria, and to have extended over the greater part of the district as far north as the Grampian Hills, his see being fixed at Candida Casa, or Whithorn in the modern Wigtownshire. His death is placed by the Bollandists in 432; his festival is the 16th September.

NINON DE LENCLOS, a celebrated Frenchwoman, one of those characters that could have appeared only in the French Society of the 17th c., was born of good family at Paris in 1615. Her mother tried to imbue her mind with a love of the principles of religion and morality, but her father, more successfully, with a taste for pleasure. Even as a child she was remarkable for her beauty and the exquisite grace of her person. She was carefully educated, spoke several foreign languages, excelled in music and dancing, and had a great fund of sharp and lively wit. At the age of ten she read Montaigne's "Essays." Six years later, she commenced her long career of licentious gallantry by an amour with Gaspard de Coligny, then Comte de Chatillon. To Coligny succeeded innumerable favorites, but never more than one at a time. Among N.'s lovers we may mention the Marquis de Villarceaux, the Marquis de Seville, the Marquis de Gersay, the great Condé, the Duc de Larochefoucauld, Marshal d'Albret, Marshal d'Estrées, the Abbé d'Effiat, Gourville, and La Châtre. She had two sons, but never shewed in regard to them the slightest instinct of maternity. The fate of one was horrible. Brought up in ignorance of his mother, he followed the rest of the world, and conceived a passion for her. When she informed him of the relation that subsisted between them, the unhappy youth was seized with horror, and blew out his brains in a frenzy of remorse. Even

this calamity did not seriously affect N.; she was too well-bred to allow it to do that. N. was nearly as celebrated for her manners as for her beauty. The most respectable and virtuous women sent their children to her a house to acquire taste, style, politeness. So great was her reputation, that when Queen Christina of Sweden came to Paris, she said she wished particularly to visit the French Academy and Ninon de Lenclos. We may gather some idea of her wit and sense from the fact that Larochefoucauld consulted her upon his maxims, Molière upon his comedies, and Scarron upon his romances. She died 17th October 1706, at the age of 90, having preserved some remains of her beauty almost to the last.—See Guyon de Sardière's "Vie de Ninon de Lenclos;" Saint-Evremond's "Œuvres;" Douximesull's "Mémoires pour servir à l'Histoire de Mlle de Lenclos."

NINTH, in Music, the next interval above the octave, being the same interval which an octave lower is termed the second. See INTERVAL.

NI'OBÉ, in Greek mythology, the daughter of Tantalus and (according to the most popular version of the story) the sister of Pelops. She was the wife of Amphion, king of Thebes, and bore him six sons and six daughters. Proud of her children, she despised Leto or Latona, who had only two children, Apollo and Diana, and prevented the people from the worship of these divinities; whereupon Latona, enraged, moved her children to destroy all the children of N. with their arrows. They lay nine days in their blood unburied, when Jupiter changed them into stone, and on the tenth day they were buried by the gods themselves. N. wandered about in distress, and at last was changed into stone on Mount Sipylus, between Lydia and Phrygia, retaining, however, even as stone a sense of her woe. Such is the Homeric legend, which, however, was afterwards much varied and enlarged. N. was a favorite subject of the ancient artists. A group representing N. and her children was discovered at Rome in 1533, and is now in Florence. Some of the sculptures are very beautiful. Even the ancient Romans were in doubt whether the work proceeded from Scopas or Praxiteles.

NIOBIUM (symbol, Nb) is a rare metal discovered by H. Rose in the mineral *Tantalite*. It is obtained by reducing the double fluoride of niobium and potassium with sodium; and forms a black powder insoluble in nitric acid, but readily soluble in a mixture of nitric and hydrofluoric acids. With oxygen it forms two compounds, niobous acid, NbO, and niobic acid, NbO<sub>3</sub>; and chlorine, bromine, fluorine, and sulphur compounds corresponding to these acids have been prepared and examined. Neither the metal itself nor any of its compounds are of any practical importance.

NIORT, a town of France, capital of the department of Deux-Sèvres, on the Sèvre-Niortaise, is situated in an agreeable country, occupying the slope of two hills and the valley which intervenes, 110 miles north of Bordeaux. Its principal edifices are the Church of Notre-Dame, the town-hall, the theatre, and the old castle. Besides these, the beautiful Fountain du Vivier, the promenades, the library, and the college are worthy of notice. The dressing of chamols and the manufacture of gloves are the principal branches of industry. Dyeworks and tanneries are in operation. Pop. (1872) 17,470.

N. is an ancient town. In the 14th c. it was taken by the English, and held by them for 18 years.

NIPA, a genus of endogenous plants referred by some botanists to the order *Pandanaceæ*, and by others to Palms. *N. fruticans* is very common in the Eastern Archipelago, and northwards as far as the Mergui River, but becomes rare further north. It flourishes with the mangrove in places inundated when the tide rises. It abounds in saccharine sap, from which a kind of *Palm Wine* is made, and also excellent sugar. The leaves are much employed for roofing houses, and large quantities are sent from the Tenasserim provinces northward for this use.

NI'PADITES, a genus of fossil palm fruits found in the Eocene clays of the Island of Sheppey, in Kent. They are referred to *Nipa* as their nearest living ally, and are considered to have resembled in habit that genus, and to have grown on the banks of an immense river which flowed from the tropical regions of a continent lying to the southward, and entered the sea at Sheppey, where it deposited the fruits

and leaves borne down with the current, by the side of the starfishes and mollusca which inhabited the estuary. Some 13 different kinds have been described.

NIPO'N, or Nippon, the largest by far of the group of islands forming the empire of Japan (q. v.). It is the mainland—the England and Wales—of Dài Nipon, or Great Nipon, the Japanese name for the empire as a whole. N. is included between 33° 30'—41° 30' n. lat., and 139° 50'—142° 20' e. long. The inland sea of Suonada separates it from the islands of Kiusiu and Sikopf, and the Strait of Sangar on the north-east from the island of Yesso. On the n. it is bounded by the Sea of Japan, and on the s. and e. by the Pacific Ocean. The length of N is 900 miles, and its breadth 240; and it has an estimated area of 42,000 square miles. Yedo (q. v.) or To-Kel, the capital of the empire, and the present residence of the Mikado; Miako (q. v.), his former residence; and Osaca (q. v.), are the largest towns. The chief treaty-ports are Hiogo, the outlet for the trade of Osaca, Yokohama (q. v.) and Kanagawa (q. v.). The ports of Yedo and Niagata, in the northern part of the island, on the Sea of Japan, the official capital of the province in which it is situated, and situated near the great mineral region of Aidsu, but unfortunately possessing a wretched harbor. Important meteorological observations, which give a good idea of the climate of the country generally, were made by Dr Hepburn at Kanagawa, the shipping port of Yeddo, in 1860. These are exhibited in a condensed form in the following table:

	Highest.	Lowest.	Rain in Inches.	Snow in Inches.	Number of Earthquakes.
January.....	59° F.	18° F.			1
February.....	53	19	$\frac{3}{8}$	2	1
March.....	69	30	$6\frac{1}{8}$	$1\frac{1}{8}$	2
April.....	76	36	$8\frac{1}{8}$		
May.....	80	44	$16\frac{1}{8}$		2
June.....	87	54	$18\frac{1}{8}$		11
July.....	92	63	$8\frac{1}{8}$		4
August.....	92	69	1 1-16th		2
September.....	89	62	$2\frac{1}{8}$		2
October.....	84	50	$7\frac{1}{8}$		2
November.....	68	36	5		4
December.....	71	22	$3\frac{1}{8}$	1	1

Bracing sea-breezes make the heat of summer very endurable. The spring and autumn months are delightful.

NIRUKTA, or "Explanation," is the name of one of the six *Vedāṅgas* (see VEDA) which explains difficult Vedic words. That there have been several works engaged in such a task, even at a very remote period of Hindu antiquity, and that they bore the name of Nirukta is probable, for "Nirukta authors" are quoted either generally or by name in several Sanskrit authors; but the work which is emphatically called "Nirukta," and which, for the present, is the only surviving representative of this important Vedāṅga, is that of Yāska, who was a predecessor of Pāṇini (q. v.). His work consists of three parts—the *Naighaṇṭuka*, where, for the most part, synonymous words are taught; the *Naigama*, which contains words that usually occur in the Vedas only; and the *Daivata*, which contains words chiefly relating to deities and sacrificial acts. A Commentary on this work has been composed by the same Yāska, and it likewise bears the name of Nirukta. In the latter, Vedic passages are quoted in illustration of the words to be explained, and the comment given by Yāska on these passages is the oldest instance, known at present to Sanskrit philology, of a Vedic gloss. Besides the great importance which Yāska's "Nirukta" thus possesses for a proper understanding of the Vedic texts, it is valuable also on account of several discussions which it raises on grammatical and other questions, and on account of the insight it affords us into the scientific and religious condition of its time.—Text and Commentary of "Yāska's Nirukta" have been edited by Professor R. Roth (Göttingen, 1852).

NIRVĀNA (from the Sanscrit *nir*, out, and *vāna*, blown; hence, literally, that

which is blown out or extinguished) is, in Buddhist doctrine, the term denoting the final deliverance of the soul from transmigration. It implies, consequently, the last aim of Buddhist existence, since transmigration is tantamount to a relapse into the evils or miseries of *Samsāra*, or the world. But as Hinduism, or the Brahmanical doctrine, professes to lead to the same end, the difference between *Nirvāna* and *Moksha*, *Apavarga*, or the other terms of Brahmanism designating eternal bliss, and consequent liberation from metempsychosis, rests on the difference of the ideas which both doctrines connect with the condition of the soul after that liberation. *Brahman*, according to the Brahmanical doctrine, being the existing and everlasting cause of the universe, eternal happiness is, to the Brahmanical Hindu, the absorption of the human soul into that cause whence it emanated, never to depart from it again. According to this doctrine, therefore, the liberation of the human soul from transmigration is equivalent to that state of felicity which religion and philosophy attribute to that Entity (see *INDIA—Religion*). As, however, the ultimate cause of the universe, according to Buddhism, is the Void or Non-entity, the deliverance from transmigration is, to the Buddhists, the return to non-entity, or the absolute extinction of the soul. However much, then, the pious phraseology of their oldest works may embellish the state of *Nirvāna*, and apparently deceive the believer on its real character, it cannot alter this fundamental idea inherent in it. We are told, for instance, that *Nirvāna* is quietude and identity, whereas *Samsāra* is turmoil and variety; that *Nirvāna* is freedom from all conditions of existence, whereas *Samsāra* is birth, disease, decrepitude and death, sin and pain, merit and demerit, virtue and vice; that *Nirvāna* is the shore of salvation for those who are in danger of being drowned in the sea of *Samsāra*; that it is the free port ready to receive those who have escaped the dungeon of existence, the medicine which cures all diseases, the water which quenches the thirst of all desires, &c.; but to the mind of the orthodox Buddhist, all these definitions convey but the one idea, that the blessings promised in the condition of *Nirvāna* are tantamount to the absolute "extinction of the human soul," after it has obeyed, in this life, all the injunctions of Buddhism, and become convinced of all its tenets on the nature of the world and the final destination of the soul.

Although this is the orthodox view of *Nirvāna*, according to the oldest Buddhist doctrine, it is necessary to point out two categories of different views which have obscured the original idea of *Nirvāna*, and even induced some modern writers to believe that the final beatitude of the oldest Buddhist doctrine is not equivalent to the absolute annihilation of the soul.

The first category of these latter, or, as we may call them, heterodox views, is that which confounds with *Nirvāna* the preparatory labor of the mind to arrive at that end, and therefore assumes that *Nirvāna* is the extinction of thought, or the cessation, to thought, of all difference between subject and object, virtue and vice, &c., or certain speculations on a creative cause, the conditions of the universe, and so on. All these views the Buddha himself rejects, as appears from the work "*Laṅkāvatāra* (q. v.), where relating his discourse on the real meaning of *Nirvāna*, before the Bodhisattva Mahāmātī. The erroneousness of those views is obviously based on the fact, that the mind, even though in a state of unconsciousness, as when ceasing to think, or when speculating, is still within the pale of existence. Thus, to obviate the mistaken notion that such a state is the real *Nirvāna*, Buddhist works sometimes use the term *Nirupadhis esha Nirvāna* or "the *Nirvāna* without a remainder of substratum" (i. e., without a rest of existence), in contradistinction to the "*Nirvāna with a remainder*;" meaning by the latter expression that condition of a saint which, in consequence of his bodily and mental austerities, immediately precedes his real *Nirvāna*, but in which, nevertheless, he is still an occupant of the material world.

The second category of heterodox views on the *Nirvāna* is that which, though acknowledging in principle the original notion of Buddhist salvation, represents, as it were, a compromise with the popular mind. It belongs to a later period of Buddhism, when this religion, in extending its conquests over Asia, had to encounter creeds which abhorred the idea of an absolute nihilism. This compromise coincides with the creation of a Buddhist pantheon, and with the classification of Buddhist saints into three classes, each of which has its own *Nirvāna*; that of the two lower degrees consisting of a vast number of years, at the

end of which, however, these saints are born again; while the absolute Nirvāna is reserved for the highest class of saints. Hence Buddhist salvation is then spoken of, either simply as *Nirvāna*, or the lowest, or as *Parinirvāna*, the middle, or as *Mahāparinirvāna*, or the highest extinction of the soul; and as those who have not yet attained to the highest Nirvāna must live in the heavens of the two inferior classes of saints until they reappear in this world, their condition of Nirvāna is assimilated to that state of more or less material happiness which is also held out to the Brahmanical Hindu before he is completely absorbed into Brahman.

When, in its large stage, Buddhism is driven to the assumption of an Adī, or primitive, Buddha, as the creator of the universe, Nirvāna, then meaning the absorption into him, ceases to have any real affinity with the original Buddhistic term. See **BUDDHISM** and **LAMAISM**.

**NISCEMI**, a town of Sicily, in the province of Caltanissetta, 10 miles north-east from Terranova, and on the right bank of the river Terranova. In 1790, this town was visited by an earthquake, and during seven shocks the ground gradually sank, in one place to the depth of 30 feet. Fissures opened, which sent forth sulphur, petroleum, hot water, and mud. Pop. 10,760.

**NISCH**, or Nissa, a town of Roumelia, European Turkey, 122 miles south-east from Belgrade. It stands on the left bank of the river Nissawa, a branch of the Morawa. The town is ill-built, but many new houses and a well-supplied bazaar, attest its present prosperity. N. has long been noted as the point of meeting of many roads, both of military and commercial importance. It seems likely to acquire fresh importance by the construction of a railway from Belgrade to Constantinople and Thessalonica. In ancient times, N. bore the name of *Naissoa*, and was a flourishing town of Upper Mœsia. About a mile from it is a tower composed of human skulls, erected to commemorate a victory of the Turks over the Servians; and not far off is the hill of Wolnik, or Kriegsburg, where, in 1689, the Markgraf Louis of Baden, with 17,000 men, destroyed a Turkish army of 40,000. Pop. 18,000.

**NISHAPUR**, or Nishapur, a town of Persia, province of Khorassan, 53 miles west-south-west of Meshid, is situated in a most beautiful and fertile valley. Pop. about 8000. It is surrounded by a rampart and trench, and has a considerable trade in *turquoises*, which are obtained from mines in its vicinity.

**NISI PRIUS** is the name (borrowed from the first two words of the old writ which summoned juries) usually given in England to the sittings of juries in civil cases. Thus a judge sitting at *nisi prius*, means a judge presiding at a jury trial in a civil cause, and the *nisi prius* sittings are the jury sittings.

**NISIBIS**, the capital of ancient Mygdonia, the north-eastern part of Mesopotamia. It was situated in a fertile district, and was of importance, both as a place of strength and as an emporium of the trade between the east and west. N. was a city of very great antiquity, but of its remoter history nothing is known. In the time of the Macedonio-Syrian kings, it was also called *Antiochea Mygdonia*. It was twice taken by the Romans (under Lucullus and Trajan), and again given up by them to the Armenians; but being a third time taken by Lucius Verna, 165 A.D., it remained the chief bulwark of the Roman empire against the Persians, till it was surrendered to them by Jovian after the death of Julian in 363. The name *Nisibis* is retained by a small village in the Turkish ejlet of Diarbekr, round which are numerous remains of the ancient city.

**NITIGHAUT**, a pass of the Himalaya, between the British district of Kumaon and Tibet. It takes its name from the village of Niti, in Kumaon, 13 miles south of the pass, in lat. 30° 47' N., and long. 79° 56' E. The pass is 16,814 feet above the level of the sea. This is regarded as the easiest pass between Kumaon and Tibet, and is consequently one of the principal channels of trade between Hindustan and Chinese Tartary. The Bhotias of Niti subelst chiefly by the carrying of goods in this trade. The articles of merchandise are conveyed on yaks, goats, and even sheep. Travellers often suffer much from difficulty of respiration on the pass of Nisi-Ghaut, on account of the rarefaction of the air.

**NITRATE OF POTASH**. See **NITRE**.



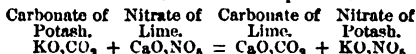
Nitrate  
Nitric

598

## NITRATE OF SODA. See NITRE.

NITRE, or Saltpetre, as it is frequently called, is the nitrate of potash ( $\text{K.O.NO}_5$ ). It usually occurs in long, colorless, striated, six-sided prisms; its taste is cooling, and very saline; it is soluble in seven times its weight of water at  $66^\circ$ , and in less than one-third of its weight of boiling water, but is insoluble in alcohol. When heated to about  $660^\circ$ , it fuses without decomposition into a thin liquid, which, when cast in moulds, solidifies into a white, fibrous, translucent mass, known as *sal prunelle*. At a higher temperature, part of the oxygen is evolved, and nitrate of potash is formed. Owing to the facility with which nitre parts with its oxygen, it is much employed as an oxidising agent. Mixtures of nitre and carbon, or of nitre and sulphur, or of nitre, carbon, and sulphur, deflagrate on the application of heat with great energy; and if nitre be thrown on glowing coals, it produces a brisk scintillation. *Touch-paper* is formed by dipping paper in a solution of nitre, and drying it.

Nitre occurs as a natural product in the East Indies, Egypt, Persia, where it is found sometimes as an efflorescence upon the soil, and sometimes disseminated through its upper stratum. The crude salt is obtained by lixiviating the soil, and allowing the solution to crystallise. A large quantity of nitre is artificially formed in many countries of Europe, by imitating the conditions under which it is naturally produced. The most essential of these conditions seem to be the presence of decaying organic matter whose nitrogen is oxidised by the action of the atmosphere into nitric acid, which combines with the bases (potash and lime) contained in the soil. "The method employed in the artificial production of nitre consists in placing animal matters, mingled with ashes and lime rubbish, in loosely aggregated heaps, exposed to the air, but sheltered from rain. The heaps are watered from time to time with urine or stable runnings; at suitable intervals, the earth is lixiviated, and the salt crystallised. Three years usually elapse before the nitre bed is washed; after this interval a cubic foot of the debris should yield between four and five ounces of nitre. As there is always a considerable quantity of the nitrates of lime and magnesia present, which will not crystallise, carbonate of potash, in the shape of wood-ashes, is added so long as any precipitate occurs. The nitrate of lime is decomposed, and the insoluble carbonate of lime separated:



The clear liquor is then evaporated and crystallised. It has been found that the earth in which nitre has once been formed furnishes fresh nitre more readily than on the first occasion. Care is taken that the *nitre plantations*, as they are termed, shall rest upon an impervious flooring of clay, so that the liquid which drains away from them may be collected and preserved."—Miller's "Elements of Chemistry," 2d ed. vol. ii. p. 359.

Nitre does not occur in any living members of the animal kingdom, but it is found in the juices of various plants, amongst which may be named the sunflower, nettle, goose-foot, borage, tobacco, barley, &c.

All the nitre used in this country comes from the East Indies. The common varieties, which have a dirty yellowish appearance, are termed *rough* or *crude saltpetre*, while the purer kinds are called *East India refined*. The purification or refining of nitre is effected by dissolving it in water, boiling the solution, removing the scum, straining it while hot, and setting it aside to crystallise. The most common impurities are sulphate of potash, chlorides of sodium and potassium, and nitrate of lime. Chloride of barium will detect the first of these impurities, nitrate of silver the second, and oxalate of ammonia the third.

Nitre is employed in the manufacture of sulphuric acid, in the preparation of nitric acid, as an oxidising agent in numerous chemical processes, as an ingredient of fireworks, and especially in the manufacture of gunpowder. It is extensively used in medicine. In moderate doses (from ten grains to a scruple) it acts as a refrigerent, diuretic, and diaphoretic, and hence its use is indicated when we wish to diminish abnormal heat, and to reduce the action of the pulse, as in febrile disorders and hemorrhages. In acute rheumatism, it is given in large doses with great benefit. Some physicians prescribe as much as one, two, or three ounces, largely diluted

with water, to be given in the course of twenty hours; but as in several cases a single ounce has proved fatal in a few hours, the effects of such large doses should be carefully watched. It is a popular remedy in sore throat, either in the form of nitre balls, or powdered and mixed with white sugar. In either case, the remedy should be retained in the mouth till it melts, and the saliva impregnated with it gently swallowed. The inhalation of the fumes produced by the ignition of *touch-paper* often gives speedy relief in cases of spasmodic asthma.

Nitrate of potash is sometimes called *Prismatic Nitre* or *Potash Saltpetre*, to distinguish it from nitrate of soda, which is known in commerce as *Cubic Nitre* or *Soda Saltpetre*.

*Cubic Nitre*, or *Nitrate of Soda* ( $\text{NaO}, \text{NO}_3$ ), occurs abundantly on the surface of the soil in Chili and Peru. It derives its name from its crystallising in cube-like rhombohedrons. In most of its properties it resembles ordinary nitre, but in consequence of its greater deliquescence, it cannot be substituted for that salt in the preparation of gunpowder. Being considerably cheaper than the potash-salt, cubic nitre is often substituted for it in the manufacture of nitric and sulphuric acids; and it is used in agriculture as the top-dressing for wheat and oats. In several experiments it has been found that one cwt. per acre has produced an increase of twelve bushels in the wheat crop, and of four or five sacks in the oat crop.

NITRIC ACID is the most important of the five compounds which oxygen forms with Nitrogen (q. v.). Until 1849, it was only known in the hydrated form (the *aqua fortis* of the older chemists), but in that year Deville shewed that *Anhydrous Nitric Acid*, or *Nitric Anhydride* ( $\text{NO}_3$ ), might be obtained in transparent colorless crystals by the action of perfectly dry chlorine gas on well-dried crystals of nitrate of silver, the reaction being exhibited in the equation:

Nitrate of Silver. Chlorine. Chloride of Silver. Nitric Anhydride. Oxygen.



It is a very unstable compound, and sometimes explodes spontaneously. It dissolves in water with evolution of much heat, and forms hydrated nitric acid.

*Hydrated Nitric Acid* (symb.  $\text{HO}, \text{NO}_3$ , equiv. 63, sp. gr. 1.521), when perfectly pure is a colorless limpid, fuming, powerfully caustic fluid, possessing an intensely acid reaction, as shewn by its action on litmus. It boils at  $184^\circ$ , and freezes at about  $-40^\circ$ . It parts very readily with a portion of its oxygen to most of the metals, and hence is much used in the laboratory as an oxidising agent. Its mode of action on the metals requires a few remarks. In order that a metal should unite with nitric, or any other acid, it is necessary that it should be in the form of an oxide. This oxidation is, however, effected at the same time that the metal and nitric acid are brought in contact, by one portion of the latter becoming decomposed and converting the metal into an oxide, while the remaining portion combines with the oxide thus formed, to produce a nitrate. The exact nature of the decomposition varies in the case of different metals.

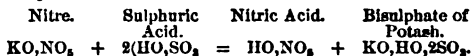
Nitric acid, whether in the concentrated or in a more dilute form, acts energetically on organic matters. As examples of such actions we may refer to its power of decolorising indigo; of staining the skin and all albuminous tissues of a bright-yellow color; of coagulating fluid albumen; and of converting cotton fibre into an explosive substance. See GUN COTTON.

The monohydrated acid ( $\text{HO}, \text{NO}_3$ ) is by no means a stable compound. If it be exposed to the action of light it is decomposed into hyponitric acid ( $\text{NO}_2$ ) (the peroxide of nitrogen of Graham) and oxygen; and mere distillation produces a similar effect. When it is mixed with water it emits a sensible amount of heat, owing to the formation of a much more stable hydrate,  $\text{HO}, \text{NO}_3 + 3\text{Aq}$ , which distils at  $250^\circ$  without change, and is unaffected by exposure to light. Its specific gravity is 1.484; and it is found that a weaker acid when heated parts with its water, and a stronger acid with its acid, till each arrives at this density. The existence of this hydrate has, however, been recently called in question by Roscoe.

The so-called *Fuming Nitric Acid* is merely a mixture of the pure acid with hyponitric acid.

Nitric acid does not occur naturally in a free state; but it is found tolerably abundant in combination with potash, soda, lime, and magnesia; and after thunderstorms traces of it, in combination with ammonia, are found in rain water. It may

be formed in small quantity by passing a series of electric sparks through a mixture of its component gases in the presence of water, which is a mere imitation, on a small scale, of the mode in which it is produced in the atmosphere by a storm. It is usually prepared in the laboratory by the application of heat to a mixture of equal weights of powdered nitre (nitrate of potash) and oil of vitriol (hydrated sulphuric acid) placed in a retort. A combination of sulphuric acid and potash remains in the retort, while the nitric acid distils over, and is condensed in the receiver, which is kept cool by the application of a wet cloth. The reaction is explained by the equation :



During distillation red fumes appear, arising from the decomposition of a portion of the nitric acid and a formation of some of the lower oxides of nitrogen. In this operation two equivalents of oil of vitriol are taken for one of nitre, these being the proportions found by experience to be most suitable. If they are taken, equivalent for equivalent, a very impure red fuming acid is the result. In the manufacture of nitric acid on the large scale, the glass retort is replaced by a cast-iron cylinder coated with fire-clay, and the receiver by a series of earthen condensing vessels connected by tubes; and nitrate of soda, found native in Peru, is substituted for nitre in consequence of its being a cheaper salt, and of its containing 9 per cent. more nitric acid.

Nitric acid combines with bases to form *nitrates*, some of which, as those of potash, soda, oxide of ammonium, silver, &c., are anhydrous, while others combine with a certain number (often six) equivalents of water of crystallisation. Most of them are soluble in water, crystallisable, and readily fusible by heat; and at an elevated temperature they are all decomposed, usually leaving only the oxide of the metal. If paper be soaked in a solution of a nitrate, allowed to dry, and ignited, it burns in the smouldering mode characteristic of *touch-paper*. This property is, however, shared by a few other salts.

The tests for this acid when it is present in small quantities are less satisfactory than those for the other ordinary mineral acids. All its compounds are so soluble that no *precipitant* for this acid is known. The best method for its detection is mixing the fluid to be tested with a little concentrated sulphuric acid, and then pouring a strong solution of protosulphate of iron upon it, so as to form a separate layer. If much nitric acid be present, a black color is produced; if only a small quantity is present, the liquid becomes reddish-brown or purple; the dark color being due to the formation of nitric oxide by the deoxidising action of a portion of the iron salt on the nitric acid.

The applications of this acid in the arts, in manufactures, and in chemical processes are very extensive.

**NITRIC ACID.** The medicinal uses of. In the British pharmacopœia there is both a strong and a dilute acid. The strong acid has a specific gravity of 1.5, and is represented by the formula  $3\text{HO}, 2\text{NO}_3$ , while the diluted acid is prepared by mixing two ounces of the former with thirteen of distilled water, and has a specific gravity of 1.101.

The dilute acid is used internally as a tonic in conjunction with bitter infusions. In many cases of chronic inflammation of the liver, and in syphilitic cases in which the employment of mercurials is inadmissible, it may be prescribed with great benefit, either alone or in conjunction with hydrochloric acid, externally as a bath or lotion, or internally in doses of about 20 minims properly diluted. The strong acid is useful as an escharotic; as to destroy warts, some kinds of polyp, the unhealthy tissue in sloughing ulcers, &c., and as an application to parts bitten by rabid or venomous animals. Largely diluted, as 50 or 60 drops of the strong acid to a pint or more of water, it forms an excellent stimulative application to torpid ulcers.

**NITRO-BENZOL**, or Nitro-Benzide ( $\text{C}_6\text{H}_5\text{NO}_3$ ), is a yellow oily fluid, of specific gravity 1.2, which may be distilled without decomposition, crystallises in needles at  $87^\circ$ , and boils at  $215^\circ$ . It has a sweet taste, is insoluble in water, but dissolves freely in alcohol and ether. Its odor is very similar to that of oil of bitter almonds.

which has led to its use in perfumery, under the name of *Essence of Nitrane*. It is obtained by treating benzol ( $C_{12}H_6$ ) with warm fuming nitric acid, when 1 equivalent of the hydrogen is replaced by 1 of hyponitric acid, so that the benzol ( $C_{12}H_6$ ) becomes converted into nitro-benzol ( $C_{12}H_5NO_2$ ).

**NITRO-BENZOL.** This substance has recently taken a prominent place amongst the narcotic poisons. Under the name of *Essence of Mirbane*, it is largely employed, as a substitute, in perfumery and confectionery, for oil of bitter almonds, which it closely resembles in smell, and to confectionery it gives the smell, but not the agreeable taste of that oil. It is a pale, lemon-colored liquid, with a pungent, disagreeable taste, and distinguishable by its odor from all other liquids, except oil of bitter almonds, from which it differs in the following reaction: Pour a few drops of each on a plate, and add a drop of strong sulphuric acid. The oil of almonds acquires a rich crimson color with a yellow border, while the nitro-benzol produces no such color. In 1859, Professor Casper of Berlin published an account of this liquid under the name of "A New Poison," and described its effects on dogs and rabbits. In 1862, and since that date, various cases of human poisoning have been published, both in this country and abroad. We shall briefly notice three cases, in two of which the patient died, after swallowing a portion of the fluid; while in the other, the inhalation of the vapor proved fatal. A boy, aged 17, while drawing off some nitro-benzol by a siphon, swallowed a portion of the liquid. There were no immediate symptoms; but he soon felt sleepy, and when at dinner, ate but little, and said he felt as if he was drunk. This was between two and three hours after he had swallowed the liquid. He fell into a stupor, which became deeper and deeper, until death took place, without vomiting or convulsions, twelve hours after the ingestion of the poison. In the case of a man, aged 43, who spilled a quantity of nitro-benzol over his clothes, and went about for several hours breathing the vapor, the effects were nearly the same. The progress of each of these cases, both of which are described by Dr Letheby in the "Proceedings of the Royal Society" for 1863, was much the same as that of slow intoxication, excepting that the mind was perfectly clear until the coming on of the fatal stupor, which was sudden, as in a fit of apoplexy. From that moment, there was no return of consciousness or bodily power; the sufferer lay as in a deep sleep, and died without a struggle. The duration of each case was nearly the same, about four hours intervening between the swallowing or inhaling of the poison and the beginning of stupor or coma, which lasted five hours. Nitro-benzol, as well as aniline, into which it seems to have been partly converted in the body, was detected in the brain and stomach. It is unnecessary to describe the steps to be taken for the detection of the poison in all these cases: no one but a professed toxicologist should be intrusted with an investigation on the result of which the life and character of a human being may depend. It is satisfactory to read Dr Taylor's opinion, that "there is no probability that this liquid will be successfully employed for the purposes of murder without the certainty of detection."—"Principles and Practice of Medical Jurisprudence," p. 311. It is worthy of notice that the vapor of this substance, as it is evolved from almond glycerine soap, has seriously affected females; and Dr Taylor mentions the case of a gentleman who, from using a cake of the soap in taking a warm bath, fainted from the effects of the vapor, and was ill for some months afterwards. The mode of treatment that should be adopted in poisoning by this substance, is essentially the same as that which should be adopted in poisoning by opium.

**NITROGEN** (symbol, N; equiv. 14; spec. grav. 0.9713) derives its name from the Greek words *nitron*, nitre, and *gen*, to produce, in consequence of its being an essential constituent of that salt. It is frequently termed *azote* (Gr. *a*, priv., *zoe*, life), especially by the French chemists, in consequence of its being a gas incapable of supporting life, and for the same reason, the German chemists term it *stickstoff*, which may be translated *choking substance*. It was discovered by Rutherford in 1772; but for its name, nitrogen, we are indebted to Chaptal.

Nitrogen is a colorless, tasteless, inodorous, permanent gas, which in its appearance in no way differs from the atmospheric air, of which it is the main ingredient. It is somewhat lighter than atmospheric air, 100 cubic inches at 60° F., and barometer 30 inches, weighing 30.119 grains, while the same volume of air weighs 30.935

inches. It is characterised rather by negative than by positive properties. It is not combustible, nor is it a supporter of combustion (a lighted taper being immediately extinguished if immersed in this gas); it is not respirable, although it is not positively poisonous; for when it is mixed with respirable gases (as with oxygen in atmospheric air) it may be breathed without injury. It is very slightly soluble in water, and hence may be collected over that fluid. Its combining powers are very slight, and although it unites with oxygen, hydrogen, chlorine, and many other substances, the union is never effected by the direct action of the elements on one another, but only by complicated processes, and many of the resulting compounds are of an exceedingly unstable nature.

Nitrogen is one of the most widely diffused elementary substances. It forms about four-fifths of the bulk of the atmosphere; for air, after having been freed from the small quantities of carbonic acid and aqueous vapor which it contains, consists, according to the experiments of Dumas and Boussingault, of 20.61 per cent. of oxygen and 79.39 per cent of nitrogen by volume, or 23.01 of oxygen and 76.99 of nitrogen by weight; the two gases in this case being uniformly mixed, but not in chemical combination with one another. It occurs, however, in combination with oxygen in the form of nitric acid ( $\text{HNO}_3$ ) in various nitrates, which are found as natural products in many parts of the globe. In combination with hydrogen, it is abundantly found as ammonia, and combined with oxygen, hydrogen and carbon, and sometimes additionally with sulphur and phosphorus. It forms the most important constituents of the solids and fluids of the animal body, and occurs in many vegetable products, especially in the alkaloids, such as morphia, strychnia, quinia, &c.

The ordinary methods of preparing and exhibiting this gas are based upon the removal of the oxygen from atmospheric air. This may be done (1) By setting fire to a small piece of phosphorus placed in a capsule, that floats on the water of the pneumatic trough, and by inverting a glass-receiver filled with air over it. The phosphorus combines with the oxygen of the air to form phosphoric acid, which dissolves in the water, while the nitrogen is left, and must be transferred to another vessel. (2) By placing a stick of phosphorus in a jar of air which is standing over water. In two or three days there will be the same results as in the former experiment—viz., phosphoric acid and nitrogen; (3) Or by passing air through a tube containing heated copper filings, which absorb the oxygen. In the above cases, a little carbonic acid is present, which may be removed by passing the gas through a solution of potash. Pure nitrogen may be directly obtained by the action of chlorine gas on a solution of the nitrogenous substance, ammonia.

Nitrogen forms with oxygen no less than five distinct compounds, containing, respectively, 1, 2, 3, 4, and 5 equivalents of oxygen, with 1 equivalent of nitrogen. These compounds are thus named and constituted: Protoxide of Nitrogen (known also as Nitrous Oxide and Laughing Gas),  $\text{NO}$ ; Binoxide (or Dextoxide) of Nitrogen (known also as Nitric Oxide),  $\text{NO}_2$ ; Nitrous Acid,  $\text{NO}_2$ ; Hyponitric Acid (known also as Peroxide of Nitrogen),  $\text{NO}_4$ ; Nitric Acid,  $\text{NO}_5$ .

*Protoxide of Nitrogen* is a transparent, colorless gas, with a sweetish taste and smell. It is much more soluble in cold than in hot water, and therefore should be collected over the latter. Under a pressure of 60 atmospheres at  $45^\circ$  it is reduced to a colorless liquid, and it may be frozen into a transparent solid at about  $-150^\circ$ . This gas is about half as heavy again as atmospheric air, its specific gravity being 1.527. It supports the combustion of many bodies, such as carbon, sulphur, phosphorus, and iron, with a brilliancy similar to that which they exhibit in oxygen; and, like oxygen, when mixed with hydrogen, it forms a mixture which explodes on the application of a flame. The most remarkable property of the gas is its intoxicating power on the animal system. It may be respired for a short time if quite pure, or if only mixed with atmospheric air, without danger or serious inconvenience. The intoxication is frequently accompanied with an irresistible propensity to muscular exertion, and usually with uncontrollable bursts of laughter, and hence the gas has received the name of *laughing gas*. It is best obtained by heating solid nitrate of ammonia in a glass retort, when it is converted into protoxide of nitrogen and water. It has recently come into frequent use as an anæsthetic in dentistry and similar cases. It is less suited to protracted operations, as the effects are transient. It produces much less disturbance of the system than chloroform.

*Binoxide of Nitrogen* is a colorless gas, very slightly soluble in water, and having a specific gravity of 1.039. Its taste and smell (if any) are unknown, since, in the presence of atmospheric air, it instantly becomes more highly oxidised, and forms yellowish-red fumes of hyponitric acid. As it is of little importance, it is unnecessary here to describe the mode of obtaining it.

*Nitrous Acid, or Nitrous Anhydride*, is a substance of which, in its uncombined state, very little is yet known further than that it is a dark-blue, very volatile fluid, which boils at  $82^{\circ}$ , and is then converted into an orange-red gas.

*Hyponitric Acid* presents a remarkable example of a body within comparatively small limits of temperature occurring in a solid, a fluid, and a gaseous form. At a temperature of  $-4^{\circ}$  it occurs in the form of colorless prismatic crystals, which are converted at about  $9^{\circ}$  into a fluid which, till the temperature reaches about  $80^{\circ}$ , is colorless; but at a higher temperature becomes yellow and orange, and at about  $82^{\circ}$  boils, and is converted into a brownish-red vapor. It is chiefly the vapor of hyponitric acid that forms the orange fumes that are produced when binoxide of nitrogen comes in contact with the air. It possesses a very disagreeable suffocating odor, and a caustic action, and colors the skin yellow, like nitric acid. It does not enter into combination with bases, but is immediately decomposed by them into nitric and nitrous acids; and it is in consequence of its not possessing this essential character of an acid that Graham has given it the name of *peroxide of nitrogen*, a term that has since been adopted by Miller and other chemists.

*Nitric Acid* is described in a special article.

Nitrogen combines with hydrogen in four proportions, but none of these compounds can be formed by the direct union of the component elements, and only one of them, viz., ammonia, has been obtained in the isolated form. They are—*Imidogen*, (NH), *Amidogen* (NH<sub>2</sub>), *Ammonia* (NH<sub>3</sub>), and *Ammonium* (NH<sub>4</sub>). Of these, the first two will be noticed under ORGANIC BASES, while the last two are sufficiently described under AMMONIA.

Nitrogen combines with chlorine, bromine, and iodine. The *chlorine of nitrogen* is a heavy, oily, orange-colored fluid, insoluble in water, and evolving a vapor of a highly irritating nature. It is one of the most dangerous compounds known in chemistry, as it explodes with extreme violence when brought in contact with phosphorus, arsenic, potash, ammonia, caoutchouc, numerous oily matters, &c., at ordinary temperatures, and spontaneously when heated to above  $200^{\circ}$ . It has occasioned so many serious accidents that we shall omit all details regarding its mode of preparation. Its exact formula is unknown. *Bromide of Nitrogen* is an oily-looking detonating liquid, resembling the chloride in appearance and properties. *Iodide of Nitrogen* occurs as a black powder, which, when dry, explodes upon the slightest touch, and often without any assignable cause.

Nitrogen enters into combination with various metals, as mercury, copper, titanium, molybdenum, and vanadium, forming a class of compounds to which the term *Nitrides* is applied. Their most marked characteristic is, that, like the preceding set of compounds, they are highly explosive, resolving themselves when struck, or at a high temperature, into their constituent elements.

**NITRO-GLYCERINE** [C<sub>3</sub>H<sub>5</sub>N<sub>3</sub>O<sub>9</sub>, or C<sub>3</sub>H<sub>5</sub>(NO<sub>3</sub>)<sub>3</sub>O<sub>6</sub>], known also as *Glonoïn* or *Glonoïn Oil*, is a compound which is produced by the action of a mixture of strong nitric and sulphuric acids on glycerine at low temperatures. Two methods of preparing it are given in Watts's "Dictionary of Chemistry," vol. ii. pp. 590, 591, to which we must refer the reader who seeks for details on this subject. According to whatever method it is prepared, it is obtained as a light yellow oily liquid, of specific gravity varying from 1.525 to 1.6, inodorous, but having a sweet pungent aromatic taste; a single drop, however, if placed on the back of the tongue, produces headache and pain in the back, which last for many hours. It is only slightly soluble in water, but dissolves readily in ether, alcohol, and methylated spirits; according to Adriani (the "Chemical News" for January 8, 1868), it does not inflame or explode when touched by a light; but regarding its inflammability there seems a difference of opinion, for Richter of Freiberg, in a recent Memoir, entitled "Experiments with Nitro-glycerine," observes that it does not take fire easily, and when lighted, burns, but does not explode, and goes out as soon as the flame with which it has been brought in contact is taken away. On this very important point further experiments are required. But although contact with flame does not cause it to explode,

this result follows if it is exposed to a moderately strong blow or concussion, to the concussion due to the explosion of gunpowder, to contact with red-hot iron, and especially to the action of detonating mixtures and fulminates; it likewise explodes on exposure to a high temperature (see below); the explosion, however it is produced, being in all cases excessively rapid, and unaccompanied by smoke. It is this explosive power that renders this compound a useful agent in blasting. According to Dr Rudolf Wagner, the distinguished Bavarian technologist, it may be cooled down to  $4^{\circ}$  without becoming solid; but this statement probably refers to the chemically pure compound; for the nitro-glycerine of commerce, which has been patented by a German, under the name of *Nobel's Patent Blasting Oil*, becomes solid if exposed for a considerable time to a temperature of  $46^{\circ}$ , crystallising in long needles, which are most dangerous to handle, since they explode, even on being gently broken, with appalling violence. At  $330^{\circ}$ , nitro-glycerine begins (according to Dr Adriani) to decompose, giving off red vapors; and if the heat be suddenly applied, or slightly raised above this point, the substance explodes with great violence; while, according to other observers, it is liable to explode at  $340^{\circ}$ , or a little higher; and if exposed for a length of time to half that temperature, explosion may take place at  $180^{\circ}$  or thereabouts. It is obvious from the formula for nitro-glycerine that it may be assumed to consist of glycerine,  $C_3H_5O_3$ , in which three atoms of hydrogen are replaced by three of peroxide of nitrogen,  $NO_2$ . The products of the complete combustion of 100 parts of pure nitro-glycerine are—water, 90 parts; carbonic acid, 53; oxygen, 8.5; and nitrogen, 18.5; and hence, it has been calculated that one volume (say, a cubic inch) of this compound, at a specific gravity of 1.6, yields, on combustion or explosion:

Aqueous vapor.....	554 volumes (say, cubic inches)
Carbonic acid.....	469 " "
Oxygen.....	89 " "
Nitrogen.....	236 " "
	1298 " "

According to Nobel, these gases expand, on explosion, to 8 times their bulk; in which case, 1 cubic measure (say, 1 cubic inch) of nitro-glycerine will yield 10,384 cubic measures (say, cubic inches) of gases; while 1 cubic measure of gunpowder will only yield 800 cubic measures of gases. Hence, it follows that, for equal bulks, nitro-glycerine is 13 times as strong as gunpowder, while for equal weights it is 8 times as strong.

The danger of using this compound in mining, &c., is greatly increased by its instability. Even when pure, it is liable, at a heat of  $70^{\circ}$  or less, to undergo slow spontaneous decomposition into glycerine, oxalic and hydrocyanic acids, ammonia, &c., with a continuous escape of gaseous products, which, exerting pressure on the liquid, renders it so prone to explosion that even a slight concussion is attended with danger; and the impure commercial compound decomposes far more rapidly than the pure nitro-glycerine: indeed, impure nitro-glycerine may, from this cause, be regarded as "dangerously self-explosive even while standing quietly" (Adriani, *op. cit.*).

Many of our readers doubtless recollect the history of a terrific explosion that took place on board the ship *European*, when lying in harbor at Colon, Panama, on the 8d of April 1866. Amongst the cargo put on board at Liverpool were 70 cases of nitro-glycerine, and one case containing 70,000 percussion-caps. At 7 A.M. on the 3d, a most tremendous explosion occurred in the after-part of the ship. It was described as most rapid, without smoke, but with a great flame, and the ship was immediately after seen to be on fire. The whole of the deck and cabin aft were carried away, and the side of the ship was also much damaged, the plates above the water-line being blown away, and the parts below it being much injured. For fear of further explosions, the ship was towed into the bay, where she shortly sunk. Nor was the injury confined to the *European*; the jetty was nearly blown away, and a vessel lying on the other side of it was much damaged. Houses in the town were also partially destroyed, the floors in many cases being torn up; and altogether about 50 lives were lost. When the bodies were recovered, they presented no sign of smoke nor any symptoms of scalding; and hence it was inferred that the explosion could not have been produced either by the percussion-caps

or by steam. On these and other grounds, the conclusion was irresistible that the explosion was due to the nitro-glycerine. An action was (August 1867) brought at Liverpool by the owners of the *European* against the shippers of the nitro-glycerine, on the ground that no due notice of the dangerous properties of that compound had been given; and at this trial, several of the important points regarding the explosive properties of nitro-glycerine, which we have noticed, were elicited from Professor Abel, chemist to the laboratory at Woolwich; Colonel Boxer, superintendent of the Woolwich Laboratory; and Professor Roscoe, who appeared as scientific witnesses. To give some definite idea of the explosive force of this substance, Professor Roscoe stated that one case of it would have sufficed for the destruction of the *European*. It is used to a considerable extent in the slate-quarries in Wales, and in mining operations. A workman at one of those quarries described how he had been set to clean a wagon which had held some of it, which he did by scraping it with a piece of slate; and inadvertently throwing the piece of slate into the wagon when he had finished, the percussion exploded the remnants of the oil, and the wagon was blown to pieces. He states that it is regarded as ten times as powerful an explosive agent as gunpowder.

We learn from a number of the "Nevada Gazette" (quoted in the "Chemical News," Aug. 16, 1867), that this substance has been advantageously employed in the blasting necessary for the construction of the summit tunnel on the Central Pacific Railway. The operation is said to have been carried on 25 per cent. faster than if powder had been used. The small holes required for the oil can probably be drilled in less than one-third the time required for the larger ones necessary in using powder. The oil does much more execution than powder, as it always breaks the rock from two to sixteen inches beyond the hole, and also throws out a much larger body. The oil was estimated as having, in hard rock, a strength five times greater than powder. It was made upon the spot, and was considered much stronger as well as safer than the imported compound. After having been used for several months, there had been no accident, nor had a single blast missed fire since the Chinamen commenced filling the cartridges. Colonel Schaffner of the U. S. army published an official Report on this compound, to which he gives the name of "nitrooleum," which confirms the fact that its explosive properties are far greater than those of gunpowder. From a Report on the same subject by Captain Grant, Jr. N., it appears that it is exploded by percussion, and apparently, under ordinary circumstances, by nothing else—neither by friction nor fire. Generally a trifling blow is sufficient to explode it. Its explosive force is about ten times that of gunpowder. It has all the appearance of common oil, and is usually carried in tin cases, each of which holds 25 lbs. Each can is packed in a wooden case for carriage. In a paper on this subject by M. Kopp, that chemist holds the view already noticed, that accidents are mainly due to the presence of impurities. He states that, by means of charges of 1860 or 2000 grammes of oil, from 40 to 80 cubic metres of a hard rock may be detached.

We have already noticed Richter's observations on the slight inflammability of this compound; and as the employment of this explosive agent seems to be increasing, we shall give his other chief results, so as to bring up our knowledge to the latest possible date. The shaft in which the experiments were made was being sunk 30 feet long by 8 feet wide, in hard gray gneiss with occasional joints, which facilitated the working. From these experiments, it appeared not only that its power was four or five times greater than that of the nitrate-of-soda gunpowder commonly used for mining purposes in Germany, but that other advantages accrued from its use, which may be summed up as follows: (1.) Fewer men are wanted for working out a certain-sized piece of ground, and fewer holes have to be bored than at present. (2.) Nitro-glycerine does not take fire easily (see above). (3.) The amount of smoke after a blast is small, as compared with that of powder; and workmen can return at once to the spot when the blast has taken place. (4.) Holes that have missed, or only partly torn, can be retamped and shot off, which, with the present arrangements, is impossible, or very dangerous. Against these advantages must be set off the following disadvantages: (1.) The gases formed during the explosion of nitro-glycerine have an injurious effect on the organs of sight and respiration. (2.) Nitro-glycerine explodes on being struck smartly, and easily freezes. (3.)



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The masses of rock which it removes are mostly very large, and considerable time has to be spent in breaking them up.

In another set of experiments, the relative cost of blasting by nitro-glycerine and gunpowder was compared, and it was found that a cubic fathom of ground could be removed by the former for £4, 0s. 4d.; the cost amounted to £5, 0s. 9½d. when the latter was used. In sinking a shaft in clay-slate by means of nitro-glycerine, the cost was under £3 per cubic fathom. For further details regarding these experiments, the reader is referred to the "Chemical News," November 15, 1867, which contains a translation of Richter's valuable Memoir.

In the "Times" for December 10, 1867, there was a notice of a serious explosion from the employment of this agent within a few miles of the city of New York. The accident happened in the Bergen quarries. Nine persons were blown to pieces, and ten or fifteen wounded, while the ground was shaken for fully a mile round, and several houses were destroyed.

A very serious accident took place on Tuesday, December 17, 1867, at Newcastle, and occasioned the loss of seven lives. The editor of the "Chemical News," December 20, 1867, remarks, that "unless means are taken by the manufacturers to prevent explosions causing such lamentable results as these, a valuable blasting agent will be lost to miners and quarriers. If this be the case, however, the manufacturers of it will have themselves to blame, for explosions of nitro-glycerine during transport or storage ought to be unknown. It has recently been discovered that nitro-glycerine dissolved in two or three times its bulk of methylated spirit is quite luxeplosive, and that, when required for use, the addition of water will precipitate the oil, the layer of water and spirit merely requiring decanting off. The nitro-glycerine separated in this way possesses explosive properties quite as active as the original oil, which, indeed, is frequently rather improved than otherwise by the treatment. Shipping agents and railway companies should refuse to receive nitro-glycerine unless protected in the manner indicated."

It will be observed that all these terrible accidents are of recent date. Although nitro-glycerine was discovered about 20 years ago by Dr Sobrero (now professor at Turin), it remained simply an object of scientific interest, till glycerine was manufactured on a large scale—that is to say, till eight or ten years ago. We believe that it was at the close of 1864 that it first became an article of commerce.

[More recently, a compound of nitro-glycerine with gun-cotton, the constituents of gunpowder, infusorial earth, and one or two other substances, forming a paste, has been invented by Professor Engels of Cologne, and is coming into extensive use for mining and other purposes. It is known as *dynamite* or *litho-fracteur* (stone-breaker), and is described as possessing immense power. Its great recommendation, however, is its safety; it can be exploded only by a percussion-cap. It may be let fall, or exposed to the most violent concussion, without being affected: when ignited by ordinary fire, as a cigar-fuse, it merely burns away with a slight hissing noise.]

**NITROUS ETHER.** or Nitrite Oxide of Ethyl, is represented by the formula  $C_2H_5O.NO$ , or  $AcO.NO$ , Ac being the symbol for ethyl ( $C_2H_5$ ). It is a pale yellow fluid, having a specific gravity of 0.947, and evolving an agreeable odor of apples. On evaporation, it produces a great degree of cold, it boils at  $62^\circ$ , and it is very inflammable. It does not mix with water, but is readily miscible with alcohol. When kept in contact with water, it soon decomposes, and an acid mixture of a very complicated character is formed. It made by mixing 1 part of starch and 10 of nitric acid in a capacious retort, which must be gently heated. The vapor of nitrous acid, which is evolved by the action of the starch on the nitric acid, is conducted into alcohol, mixed with half its weight of water, contained in a two-necked bottle, which is to be plunged into cold water. The second neck of this bottle is connected with a good cooling apparatus; and the vapor combining in its passage through the alcohol with the oxide of ethyl, forms nitrous ether, which distils in a continuous stream. This, which is known as Liebig's method, is the best process, but it is usually prepared by the direct action of nitric acid on alcohol, in which case the nitric acid is deoxidised by the hydrogen and carbon of the ethyl of part of the alcohol.

The *Spirit of Nitrous Ether*, or *Sweet Spirit of Nitre*, used in medicine, is a mixture of nitrous ether with about four times its volume of rectified spirit. Its specific

gravity should not exceed 0.95. It is used, in conjunction with other medicines, as a diuretic, especially in the dropsy which follows scarlatina; and it is employed, in combination with acetate of ammonia and tartarised antimony, in febrile affections. The dose in febrile cases is from half a drachm to a couple of drachms, and if we wish it to act as a diuretic, two or three drachms should be given. It is a rather expensive medicine, and consequently is extremely liable to adulteration. In the new British Pharmacopœia, it is recommended that this substance should be directly obtained by the distillation of nitrite of soda (five ounces), sulphuric acid (four fluid ounces), and rectified spirit (two pints)—a process open to many practical objections.

NITZSCH, Karl Immanuel, one of the most distinguished theologians that modern Germany has produced, was born September 21, 1787, at Bornä. He studied for the church at Wittenberg, where he took his degree in 1810, and where, in 1813, he became parish minister. Here his religious opinions underwent a great modification, through the influence of Schleiermacher and Daub, and he awoke to a clearer perception of the essence of religion. From this time forward N. is to be regarded as one of that new school—of which Neander is the greatest representative—who endeavored to reconcile faith and science, not by forced and unnatural methods, but by pointing out their distinctive spheres, and by exhibiting in their own spiritual life that union of reason and reverence for which they argued in their writings. In 1822, N. was called to Bonn as ordinary professor of theology and university preacher, where he labored with great diligence for more than twenty years, not only in theology, but in all matters affecting the welfare of the Prussian church. In 1847, he succeeded Marheineke at Berlin, and as professor, university preacher, and upper consistorial councillor, he exercised with prudence and moderation a wide ecclesiastical influence. In his political (perhaps also in his religious) views he may be classed with the late Chevalier Bunsen. The High Lutheran party having denounced liberal politics as irreligious, N. and Bunsen and others have vindicated them on the ground of Christianity, not without success. In theology, his position will be best understood when we say that he subordinated dogma to ethics, or rather that he believed the only dogmas which can hope to permanently maintain themselves are those that result from an ethical apprehension of Christianity. Besides numerous smaller treatises on Dogmatics, the History of Dogmas and Liturgies, three larger works call for special mention. These are his "System der Christlichen Lehre" (Bonn, 1829; 6th edit. 1851); his "Praktische Theologie" (Bonn, 1847-1848); and his "Predigten," or "Sermons," of which several collections have appeared, and which are remarkable for their extraordinary richness of thought. He died in 1868.—NITZSCH, GREGOR WILHELM (born in 1790), brother of the preceding, acquired a high reputation as a philologist, and was professor of archæology at Leipzig till his death in 1861. He was considered one of the ablest opponents of Wolf's Homeric theories. His chief work is "Die Sagenpoesie der Griechen" (Brunswick, 1852).

NIVELLES (Flem. *Nyvel*), a town of Belgium, in the province of Brabant, 18 miles south of Brussels. It has a fine church, called the Church of St Gertrude (built in the Romanesque style of architecture, 1648 A.D.), which claims to contain the relics of St Gertrude, daughter of Pepin, Maire du Palais. They are deposited in a shrine placed over the high-altar. N. has manufactures of linen, cotton, lace, &c. Pop. in 1870, about 9300.

NIVERNAIS, formerly a province in the middle of France, nearly corresponding to the present department of Nièvre. It was divided into eight territorial districts, and its towns enjoyed municipal privileges at a very early period. The principal landowners were the counts, afterwards dukes, of Nevers, who held under their vassalage more than 1800 fiefs.

NIX, in the masculine, and *nixe* in the feminine (Old High Ger. *nithus*; Anglo-Saxon, *nicor*; Dutch, *nikker*; Old Norse, *nikr*; Swed. *näk, nek*; Dan. *nök, nok*—whence our name for the devil, *Nick*, not as some absurdly suppose, from *Nicholas Machiavelli*), the common name for all water spirits in the Teutonic mythology. They are represented as of human form, or sometimes as passing into that of a fish or of a horse. They love music and dances, and possess the gift of prophecy, like the Greek Muses, Sirens, and other water gods. The nix taught, in return for

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a good gift, the art of playing on a stringed instrument; and often in the evening sunshine the nixes, combing their long hair, were wont to mingle in the dances of mortals; but their company was dangerous, for, though sometimes wearing a mild appearance, they were more frequently cruel and malignant.—The *water-kepi* of Scotland must be reckoned a member of the genus Nix, but in him the evil element alone exists. He generally, if not always, assumed the form of a water-horse; frequented fords and ferries, especially during storms; allured travellers to mount him, and then dashed furiously with them into the stream which he had flooded by his devilish power, and submerged them in the roaring currents.

**NIZAM'S DOMINIONS**, an extensive territory in the interior of Southern India, lying to the north-west of the Presidency of Madras, in lat.  $15^{\circ} 10'$ — $21^{\circ} 45'$  n., and long.  $74^{\circ} 40'$ — $81^{\circ} 32'$  e. Length from south-west to north-east 480 miles; extreme breadth, 340 miles. Area, 90,000 square miles, and population estimated at 9,000,000. The surface is a slightly-elevated table-land. The principal rivers are the Godavari (Godavery), with its tributaries the Dudhna, Manjira, and Pranhita; and the Kistna (Krishna), with its tributaries the Bimab and Tungabhadra. The soil is naturally very fertile, but poorly cultivated; yet, wherever it receives moderate attention, it yields harvests all the year round. The products are rice, wheat, maize, mustard, castor-oil, sugar-cane, cotton, indigo, fruits (including grapes and melons), and all kinds of kitchen vegetables. The pasturages are extensive, and sheep and horned cattle are numerous. Marsh and jungle, however, occupy a great space, and originate, fevers, agues, diseases of the spleen, &c., though the climate is quite healthy where these do not abound. The mean temperature of the capital, Hyderabad, in January is  $74^{\circ} 80'$ , and in May  $93^{\circ}$ . The inhabitants manufacture for home use woollen and cotton fabrics, and export silk, dressed hides, dye-stuffs, gums, and resins. Good military roads traverse the territory. The revenue of the Nizam is reckoned at £1,550,000 yearly. The ruler is a Mohammedan, but his subjects are mostly Hindus.

In 1657, the territory, now known as the Nizam's Dominions, became a province of the Mogul empire; but in 1719, the governor or viceroy of the Deccan, Asaf Jah, made himself independent, and took the title of *Nizam-ul-Mulk* (Regulator of the State). After his death, in 1748, two claimants appeared for the throne, his son Nazir Jung, and his grandson Mirzapha Jung. The cause of the former was espoused by the East India Company, and that of the latter by a body of French adventurers under General Dupleix. Then followed a period of strife and anarchy. In 1761, Nizam Ali obtained the supreme power, and after some vacillation signed a treaty of alliance with the English in 1768. He aided them in the war with Tippoo, sultan of Mysore, and at the termination of that war, in 1799, a new treaty was formed, by which, in return for certain territorial concessions, the East India Company bound itself to maintain a subsidiary force of 8000 men for the defence of the Nizam's dominions. The Nizam remained faithful to the British during the mutiny of 1857—1858. The territory is frequently called Hyderabad or Haidarabad. A British resident advises the Nizam.

**NOBILÉ OFFICIUM**, the term used in the Law of Scotland to denote the high prerogative right of the Court of Session to exercise jurisdiction in certain cases—as, for example, to appoint a judicial factor to young children or to lunatics.

**NOBILITY**, that distinction of rank in civil society which raises a man above the condition of the mass of the people. Society has a tendency to inequality of condition, arising from the natural inequality, physical, moral, and intellectual, of those who compose it, aided by the diversity of external advantages, and of the principles and habits imbibed at an early age. This inequality is apt to increase: the son, inheriting the faculties of his father, is more favorably situated than his father was for making use of them; and hence, in almost every nation in even the very early stages of civilisation we find something like a hereditary nobility. Privileges originally acquired by wealth or political power, are secured to the family of the possessor of them; and the privileged class come to constitute an order, admission into which requires the consent of society or of the order itself.

The ancient Romans were divided into *nobiles* and *ignobiles*, a distinction at first corresponding to that of patricians and plebeians. A new nobility afterwards sprung out of the plebeian order, and obtained (336 B.C.) the right to rise to high

offices in the state; and in course of time the descendants of those who had filled curule magistracies inherited the *jus imaginum*, or right of having images of their ancestors—a privilege which, like the coat-of-arms in later ages, was considered the criterion of nobility. The man entitled to have his own image was a *novus homo*, while the *ignobilis* could neither have his ancestor's image nor his own.

The origin of the feudal aristocracy of Europe is in part connected with the accidents which influenced the division of conquered lands among the leaders and warriors of the nations that overthrew the Roman empire. Those who had acquired a large share of territorial possession, and their posterity to whom it was transmitted, were naturally looked on as the fittest persons to occupy the great offices of state and wield political power. The Frankish kingdom in Gaul was divided into governments, each under the authority of a chieftain called a Count or *Comes*—a designation derived from the *comes* of the Roman empire—whose Teutonic equivalent was *Graf*. A higher dignity, and more expensive jurisdiction, was conferred on the *Dux* or Duke, a term also of Roman origin, and implying the duty of leading the armies of the country. In the Lombard Kingdom of Italy, the same term was applied to the great officers who were intrusted with the military and civil administration of cities and their surrounding provinces. The Marquises were guardians of the frontier marches. In the subinfeudations of the greater nobility originated a secondary sort of nobility, under the name of Vassours, Castellans, and lesser barons; and a third order below them comprised vassals, whose tenure, by the military obligation known in England as knight's service, admitted them within the ranks of the aristocracy. In France, the allegiance of the lesser nobles to their intermediary lord long continued a reality; in England, on the other hand, William the Conqueror obliged not only his barons who held in chief of the crown, but their vassals also, to take an oath of fealty to himself; and his successors altogether abolished subinfeudation.

The military tenant, who held but a portion of a knight's fee, participated in all the privileges of nobility, and an impassable barrier existed between his order and the common people. Over continental Europe in general, the nobles, greater and lesser, were in use, after the 10th c., to assume a territorial name from their castles or the principal town or village on their demesne; hence the prefix "*de*," or its German equivalent "*von*," still considered over a great part of the continent as the criterion of nobility or gentility. Britain was, to a great extent, an exception to this rule, many of the most distinguished family names of the aristocracy not having a territorial origin. See NAME.

Under the feeble successors of Charlemagne, the dukes, marquises, and counts of the empire encroached more and more on the royal authority; and in course of time, many of them openly asserted an independence and sovereignty with little more than a nominal reservation of superiority to the king. By the end of the 9th c., the Carolingian empire had been parcelled into separate and independent principalities, under the dominion of powerful nobles, against whom, in Germany, the crown never recovered its power. In France, however, the royal authority gradually revived under the Capetian race, the great fiefs of the higher nobility being one by one absorbed by the crown. In England, where the subjection of the feudal aristocracy to the crown always was, and continued to be a reality, the resistance of the nobles to the royal encroachments was the means of rearing the great fabric of constitutional liberty. All those who, after the Conquest, held *in capite* from William belonged to the nobility. Such of them as held by barony (the highest form of tenure) are enumerated in "*Domesday*." Their dignity was territorial, not personal, having no existence apart from baronial possession. The *comes* was a baron of superior dignity and greater estates; and these were in England the only names of dignity till the time of Henry III. The rest of the landholders, who held by other tenures than barony, also belonged to the nobility or gentry.

After the introduction of Heraldry, and its reduction to a system, the possession of a coat-of-arms was a recognised distinction between the noble and the plebeian. In the words of Sir James Lawrence ("*Nobility of the British Gentry*"): "Any individual who distinguishes himself may be said to ennoble himself. A prince judging an individual worthy of notice, gave him patent letters of nobility. In these letters were blazoned the arms that were to distinguish his shield. By this shield he was to be known or *nobilis*. A plebeian had no blazonry on his shield, because he

was *ignobilis*, or unworthy of notice. Hence arms are the criterion of nobility. Every nobleman must have a shield of arms. Whoever has a shield of arms is a nobleman. In every country of Europe without exception, a grant of arms, or letters of nobility, is conferred on all the descendants." On the continent, the term noble is still generally used in this sense; in England, it is now more common to restrict the words noble and nobility to the five ranks of the peerage constituting the greater nobility, and to the head of the family, to whom alone the title belongs. Gentility, in its more strict sense, corresponds to the nobility of Sir J. Lawrence and of continental countries. This difference of usage is a frequent source of misapprehension on both sides of the Channel; at some of the minor German courts, the untitled member of an English family of ancient and distinguished blood and lineage has sometimes been postponed to a recently-created baron or "Herr von," who has received that title, and the gentility accompanying it, along with his commission in the army. It has been taken for granted that the latter belongs to the "Adel" or nobility, and not the former.

The original higher nobility of Germany consisted of the dynasty nobles, i. e., the electoral and princely houses of the realm, with those counts and barons who had a seat in the diet or estates of the realm. These last have, since 1815, all been elevated to higher titles; most of the counts, in recompense for their acquiescence in the abolition of the German empire, receiving the diploma of prince, a title to which our dukes, marquises, and earls have also an undoubted right. The lower German nobility, corresponding to our gentry, were the merely titular Counts and Barons (i. e., those who had no seat in the Diet), the Edel-herren and Banner-herren (something like our Bannerets), the Knights of the Holy Roman Empire, the "Edlen von" (who now take the style of baron), and the common nobles distinguished only by the prefix "von." Throughout the middle ages, the lesser nobility of Britain preserved a position above that of most continental countries, being, unlike the corresponding class in Germany, allowed to intermarry with the high nobility, and even with the blood-royal of their country.

The higher nobility, or nobility in the exclusive sense, of England, consist of the five temporal ranks of the peerage—Duke, Marquis, Earl, Viscount, and Baron (in the restricted signification of the word), who are members of the Upper House of Parliament. Formerly, all the barons or tenants-in-chief of the sovereign were bound to attend his councils; but after the reign of Edward I., only a select number of them were summoned, the rest appeared by representatives—the former were considered the greater, the latter the lesser barons. See MINOR BARONS. In Scotland the whole barons continued to sit in parliament till a much later period; and after the minor barons attended only by representatives from their body, these representatives sat in the same house with the greater nobility, and up to the Union, their votes were recorded as those of the "small barrounis." By the Act of Union between England and Scotland, the Scotch peers elect 16 of their number to represent their body in the House of Lords in each parliament. The peers of Ireland, in virtue of the Irish Act of Union, elect 28 of their number to sit in the House of Lords for life. The Act of Union with Scotland has been understood to debar the sovereign from creating any new Scotch peerages; all peers created in either England or Scotland between that date and the Union with Ireland are peers of Great Britain; and peers created in any of the three kingdoms subsequently to the union with Ireland are peers of the United Kingdom, with this exception that one new peerage of Ireland may be created on the extinction of three existing peerages. When the Irish peers are reduced to 100, then, on the extinction of one peerage another may be created. All peers of Great Britain or of the United Kingdom have a seat in the House of Lords. A Scotch peer, though not one of the sixteen representative peers, is debarred from sitting in the House of Commons, a disability which does not attach to Irish peers. The peerage is, from time to time, recruited by new additions, the persons selected being in general peers of Scotland or Ireland; younger members of the families of peers; persons distinguished for naval, military, political, or diplomatic services; eminent lawyers, promoted to high judicial appointments; persons of large property and ancient family, noble in the more extended sense; and occasionally, but rarely, persons who have by commerce acquired large fortunes and social importance. At present, the peerage comprehends about 555 individuals—the number of peerage titles being much

greater, as several titles often merge in one person. Five royal dukes are included in this enumeration, as also 87 peers of Scotland, and 183 of Ireland. Only 25 of the present Scotch, and 89 Irish peers, are without seats in the House of Lords, in consequence of there being, besides the representative peers, 40 peers of Scotland, and 80 of Ireland, who are at the same time peers either of England, Great Britain, or of the United Kingdom. The privileges belonging to peers as members of parliament will be explained under PARLIAMENT; as peers they also possess the following immunities: They can only be tried by their peers for felony, treason, or misprision of treason, when the whole members of the peerage are summoned, and the accused is acquitted or condemned by the voice of the majority, given not on oath, but "on honor." This privilege, which extends to peeresses, either in their own right or by marriage, is in Scotland further regulated by Act 6 Geo. IV. c. 66. A peer answers to bills in Chancery upon his honor, and not on oath; but when examined as a witness in civil or criminal cases, or in parliament, he must be sworn. He cannot be bound over to keep the peace elsewhere than in the Court of Queen's Bench or of Chancery. Scandal against a peer is "*scandalum magnatum*," a more heinous offence than slander against another person, and subjects the offender by various English acts to statutory punishments. All the privileges belonging to the English peers, except the right of sitting in the House of Lords, were extended to the peers of Scotland by the Treaty of Union. A peer who has different titles in the peerage, takes in ordinary parlance his highest title, one of the inferior titles being given by courtesy to his eldest son. Certain Courtesy Titles (q. v.) belong also to the daughters and younger sons of a peer, but do not extend to their children.

In France, a limited body of the higher nobility, styled the peers, were in the enjoyment of privileges not possessed by the rest. The title of Duke was subject to strict rule, but many titles of Marquis and Count, believed to be pure assumptions, were recognised by the courtesy of society. The head of a noble family often assumed at his own hand the title of marquis; and if an estate was purchased which had belonged to a titled family, the purchaser was in the habit of transferring to himself the honors possessed by his predecessor—a practice to which Louis XV. put a stop. Immediately before the Revolution, 80,000 families claimed nobility, many of them of obscure station, and less than 3000 of ancient lineage. Nobles and clergy together possessed two thirds of the land. Practically, the estimation in which a member of the French nobility was held depended not so much on the degree of his title as on its antiquity, and the distinction of those who had borne it. The higher titles of nobility were not borne by all members of a family; each son assumed a title from one of the family estates—a custom productive of no small confusion. Unlike "roturier" lands, which divided among all the children equally, noble fiefs went to the eldest son. The Revolution overthrew all distinction of ranks. On 18th June 1790, the National Assembly decreed that hereditary nobility was an institution incompatible with a free state, and that titles, arms, and liveries should be abolished. Two years later, the records of the nobility were burned. A new nobility was created by the Emperor Napoleon I. in 1808, with titles descending to the eldest son. The old nobility was again revived at the Restoration. All marquises and viscounts are of pre-revolution titles, none having been created in later times.

Commercial pursuits have more or less in different countries been considered incompatible with nobility. In England, this was less the case than in France and Germany, where for long a gentleman could not engage in any trade without losing his rank. A sort of commercial "*Bürger-Adel*," or half-gentleman class, was constituted out of the patrician families of some of the great German cities, particularly Augsburg, Nürnberg, and Frankfurt, on whom the emperors bestowed coats-of-arms. In semi-feudal Italy, there was on the whole less antagonism between nobility and trade than north of the Alps. The aristocracy of Venice had its origin in commerce; and though untitled, they were among the most distinguished class of nobles in Europe. On the other hand, in Florence, in the 14th c., under a constitution purely mercantile, nobility became a disqualification from holding any office of the state. In order to the enjoyment of civil right, the nobleman had to be struck off the rolls of nobility; and an unpopular plebeian was sometimes ennobled, in order to enfranchise him. A little later, there grew up, side by side with the old nobility, a race of plebeian nobles—as the Ricci, the Medici—whose pretensions were originally

Noora  
Noctule

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derived from wealth, and who eventually came to be regarded as aristocrats by the democratic party.

Italian nobility has this peculiarity, that it does not, for the most part, flow from the sovereign, but from the municipal authorities of the towns acting in entire independence of him. The municipalities can confer nobility on whom they please, by inscribing his name in their respective *Libri d'oro*. The registers of nobility of most of the Tuscan towns are deposited in the *Archivio della Nobiltà*, or Herald's Office at Florence—an institution created by the first sovereign of the House of Lorraine. The municipalities have, however, no power to confer titles, though at one time several persons, a few Englishmen included, on the strength of their names being in the *Libro d'oro* of Fiesole, assumed the titles of marquis, count and baron—an abuse put a stop to by the late grand duke of Tuscany. In Rome, there is a small number of nobles—as the Colonnas, Caetanis and Orsini—who hold their fiefs as sovereign princes; the rest of the nobility, many of them of very ancient lineage, are municipal, the power of creation being vested in the senator, himself a nominee of the pontiff, and the *Conservatori*, chosen by lot from the Capitoline nobles. In last century, so many undistinguished persons had been added to the roll of nobility, that Pope Benedict XIV. found it necessary to prohibit by a bull the admission of any one whose ancestors had not filled certain high office in the state. The same decree limited the number of noble families to 187, designed the *Patriziato Romano*, out of whom 60 of the oldest and most illustrious were chosen as *Nobili Conseritti*, otherwise called the Capitoline nobles, and restricted the admission to the patriziato for the future to persons who had rendered important services to the city, and whose names were approved by the *Congregazione araldica*, an exception being made in favor of members of the reigning pontiff's family. As the families of the *conseritti* became extinct, other patrician families, designated *Nobili Aseritti*, were added by the municipality to make up the number.

The titles at present borne by the Roman nobility are: 1. Prince or Duke, generally so called, but officially designed "*Barone Romano*"—a title acquired by the Borghesi, Rospigliosi, and others from popes of their respective families; in the case of the Colonnas, Doria, Odescalchi, &c., from royal or imperial erection; and in other instances—as the Caetani and Massimi—from investiture by the pope as a temporal sovereign. 2. Marquis and Count; many of these are provincial nobles, with titles generally derived from small feudal tenures, of which, in some instances, it would be difficult to shew the diploma, or point out the period of creation. In some parts of the Papal States it is understood that every head of a noble house is a marquis; and in the March of Ancona, Sixtus V. conferred the right to bear the title of count on all who were of noble blood at the period. 3. Knights (*Cavalieri*), a designation given to all who wear a Roman order, to Knights of Malta, and generally to younger sons of the titled nobility. 4. Princes, who, with the sanction of the pope, have purchased honors along with ancient fiefs, that carried with them ducal or princely titles, most of them *novi homines*, as the Torlonias. Titles do not descend to the younger members of the family; it is the general usage for the head of the house to bear the most ancient title, while the eldest son, on his marriage, assumes the second in point of antiquity. The title is sometimes the family name, sometimes the name of a feudal possession. The proper designation of the younger branches of titled families is "*dei Principi*," "*dei Duchi*," "*dei Marchesi*," &c.

The nobility of Spain boasts of a special antiquity and purity of blood, a descent from warriors and conquerors alone, without the infusion of any of the elements derived from the church, law, and commerce that are to be found in other countries. "*Hidalgo*" (*hijo d'algo*, son of somebody, not *filius nullius*) is a term which implies gentility or nobility. The *hidalgo* alone has in strictness a right to the title "*Don*," which, like "*Sir*" of our knights and baronets, requires the adjunct of the Christian name. When the Christian name is omitted, the title "*Señor*" instead is prefixed with the addition of "*de*." "*Don*" has latterly been used by persons who have no proper claim to it about as extensively as "*Esquire*" in England. *Hidalguia*, till recently, conferred important privileges and immunities. The higher nobility are styled *Grandees*; formerly the title was "*ricohombre*," and the ceremonial of creation consisted in granting the right of assuming the pennon and caldron (*peñon y caldera*)—the one the rallying

assign of command, the other of maintenance of followers. In contradistinction from the grandees, the class of nobility below them are called *los Titulados de Castilla*. Red blood is said to flow in the veins of the hidalgo, blue in that of the grandee. Formerly there were three classes of grandees, whose mark of distinction was this—that a grandee of the first class was entitled to put on his hat in the royal presence before the king spoke to him; the second, after the king spoke to him; the third, after the king had spoken and he had replied. The second and third classes are now absorbed into the first. Of the grandees, some bear the title of duke, some of marquis, some of count; but it is the ambition of every grandee to unite in himself as many grandeeships, or have as many *hats*, as the phrase is, as he can. This is effected by the marriage of heiresses through whom *grandezza* descends, and whose names and titles are assumed by their husbands. An enormous accumulation of titles is sometimes found in the person of one grandee. Titles as well as estates go only to heirs of entail. The titulars of Castile are designed "*vuestra senoria*;" in common parlance, "*ucia*." The title of Baron is little used in Spain. Physically and mentally, the grandees have degenerated from their ancestors, and they have not the influence at court and in the country which lauded property ought to give them. Most of them reside at Madrid, clinging to their nominal rank and real nullity, while they are practically excluded from all the functions of state.

In Russia, what nobility existed before Peter the Great was of a patriarchal not a feudal kind; but in his anxiety to assimilate everything to a western standard, the czar took the existing aristocracies of states quite differently situated as the model to which to approximate the fortunate of his own subjects. The Russian nobles have ever since been enlarging their privileges by encroachments on those under them. Before Moscow was burned, the mass of the nobles connected with the court lived there in great splendor, and along with their domestic serfs constituted half the population of that city.

The preservation of noble blood, untainted by plebeian intermixture, has often been reckoned a matter of much moment. In Spain most of all, this purity of lineage has been jealously guarded. In the German empire, no succession was allowed to fens holding immediately of the emperor, unless both parents belonged to the higher nobility. In France, the offspring of a gentleman by a plebeian mother was noble in a question of inheritance or exemption from tribute, but could not be received into any order of chivalry. Letters of nobility were sometimes granted to reluctant persons in this position. It is in Germany still important for many purposes to possess eight or sixteen quarterings, i. e., to be able to shew purity of blood for four or five generations, the father and mother, the two grandmothers, the four great-grandmothers; and also, in case of the sixteen quarterings, the eight great-grandmothers, having all been entitled to coat-armour. Among the higher grades of the peerage in England, a considerable number may be pointed out who do not possess this complete nobility. It is in Scotland more usual and more regarded, both among peers and entitled gentry, where the eight or sixteen quarterings are still in use to be displayed on the funeral escutcheon. At some of the minor German courts, the sixteen quarterings were not unfrequently an illusion, diplomas being granted in the absence of a full pedigree, to declare the parties as noble as if they had sixteen ancestors.

NOCERA, or Nocera Dei Pagu'ni, a town of South Italy, in the province of Salerno, eight miles north-west of the town of Salerno, and on the highway from that town to Naples. It carries on linen and woollen manufactures. Pop. 8519.

NOCTURN (Lat. *nocturnum*, recited "by night"). Under the head BREVIARY (q. v.) has been explained the general order of the services of the canonical hours, in the Roman Catholic Church. The service of MATINS on Sundays and festivals is divided into three nocturns, each of which consists of three (or more) psalms and three lessons. The lessons are either from the Scriptures, from the life of a saint, or from a homily of some Father. The name is derived from the recitation of the service "by night."

NOCTULE (*Vespertilio noctula*), the largest British species of Bat (q. v.), being nearly three inches long without the tail, which is fully an inch and a half. The ears



Nodal  
Nola

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are oval triangular, shorter than the head; the muzzle is short and blunt. The N. is only seen on the wing during a short part of the year, retiring early in autumn to hollow trees, caves, or under the eaves of buildings, where many are sometimes found together.

**NODAL POINTS, Lines, and Sections.** When a string or metallic cord, under strong tension, is made to vibrate, we hear, besides the principal sound, several secondary and shriller sounds; these are denominated harmonic sounds, and are produced each by a certain portion of the cord which vibrates independently. Further investigation has shewn that every vibrating string is divided into a number of portions alternately vibrating in opposite directions, and that the points which separate these portions from each other are at rest. These points are known as *nodal points*, and their situation may be found by placing small pieces of paper on an extended string, and causing it to vibrate; the points from which the pieces of paper have not been displaced are the nodal points. If a plate of glass or metal be held in the hand, and a well-roined fiddle-bow be drawn across the edge, particles of fine dust previously placed on the plate, will arrange themselves in lines, shewing that along these lines no vibration has taken place; these lines are *nodal lines*, and are found in most cases to group themselves together into geometrical figures, and occasionally to present the most beautiful designs. The arrangement of the nodal lines depends on the point by which the plate is held, and on the form of the plate itself. Similarly, if a column of air in a wholly or partially closed tube be acted upon by the force of the breath applied through a hole at any point in its length, the column will divide itself into cylindrical portions each in a state of vibration, and separated from one another by transverse sectional portions in which the air is at rest; these latter sections are known as *nodal sections*.

**NODDY** (*Megalopterus* or *Anous*), a genus of birds of the family *Laridae*, differing from terns in having the bill slightly angular, thus exhibiting an approach to gulls, and the tail not forked but somewhat wedge-shaped. Only one species is known (*M.* or *A. *slolidus**), a bird widely diffused both in the northern and southern hemispheres, and familiar to sailors, not only as often seen skimming over the water in quest of fishes, but also as not unfrequently alighting on vessels, and particularly during the night, suffering itself to be taken by the hand. At its breeding-places also, where not accustomed to the visits of man, it scarcely gets out of the way, and the female sits undisturbed on the nest. Hence it commonly shares with the Booby the reputation of unusual stupidity. It is about fifteen or sixteen inches long, from the tip of the bill to the end of the tail, the general color being a brownish-black. The N. is a rare visitant of the British shores, but is very abundant in warmer latitudes; and on some of the *keys* of the West Indies, and other islets of different parts of the world, it breeds in immense numbers. Particular islets seem to be specially selected as the breeding-places of noddies; and there their nests are sometimes so closely placed that it is not easy to walk among them. Each nest generally contains three eggs, about two inches long, which are very good to eat, and are in some places collected in great numbers.

**NODES**, in Astronomy, are the two points in which the orbit of a planet intersects the plane of the ecliptic, the one through which the planet passes from the south to the north side of the ecliptic being called the *ascending node*, and the other the *descending node*. As all the bodies of the solar system, whether planets or comets, move in orbits variously inclined to the ecliptic, the orbit of each possesses two nodes, and a line drawn joining these two points is called the *line of nodes* of each body. It is scarcely necessary to add, that as the earth moves in the plane of the ecliptic she has no nodes. The places of the nodes are not fixed points on the plane of the ecliptic, but are in a constant state of fluctuation, sometimes *advancing* (eastward), and at other times *receding* (moving westward). This motion is produced by the mutual attractions of the planets, which tend to draw each of them out of the plane of its orbit; and it depends upon the relative positions of the planets with respect to another planet whether that planet's nodes shall advance or recede. On the whole, however, the majority of possible "relative positions," or *configurations*, as they are called, is in favor of a retrograde motion; and we find by observation, that in an average of many revolutions round the sun a constant retrogradation of the node takes place. The determination of this retrogradation in the case of the

planets is a most complicated problem, as the separate action of each on the others has to be taken into account; but in the case of the moon's nodes, the immensely preponderating attraction of the earth, and its great relative magnitude as compared with the moon, enable us to throw out of account any other disturbing influence, and at the same time to exhibit clearly the cause of this motion of the nodes. Suppose the moon to have attained her greatest north latitude, and to be descending towards the ecliptic, and the earth to be in longitude between her and her previous descending node, then the earth's attraction will tend to depress the moon's orbit, and cause her to descend to the plane of the ecliptic sooner than she would otherwise have done; in this case we have a retrogradation of the node. Again, supposing the moon placed as before, but the earth in advance of the line of nodes, then the earth's attraction will tend to draw the moon forward in her orbit so as to meet the ecliptic in a point beyond the previous descending node; in this case, the moon's node has advanced. As in the case of the planets, however, the retrograding tendency preponderates. The average annual retrogradation of the nodes is very small in the case of the planets, but considerable in that of the moon. See MOON. In calculating the courses of the planets, the "length" of the ascending node, or its distance in longitude from the vernal equinox is a most important element. See ORBIT.

**NODES, in Botany.** See STEM.

**NODES** are swellings, most commonly of an oblong form, which occur on superficial bones, such as the tibia, ulna, clavicle, and frontal bone, and are due to a syphilitic taint, to scrofula, or to rheumatism. Their immediate cause is the infiltration of lymph or serum into the periosteum, or between it and the bone. The treatment depends so essentially on the constitution of the patient, and the primary cause of the swelling, that it would be inexpedient to enter into any detail regarding it.

**NODIER, Charles E.**, an eminent French littérateur, was born at Besançon, 29th April 1763; other authorities give 1760 and 1781. His father was a distinguished lawyer, who warmly embraced the side of the revolution, and brought up his son in the same principles. At the age of 12, he was a member of the famous society of *Amis de la Constitution*, and hated tyranny with a most ideal and classical hatred; but he soon afterwards became a royalist; then, again under Napoleon, a republican; and indeed during his whole career shewed a want of that robust opinionativeness, without which it is impossible for a man to become a genuine politician. He died—after a life of the hardest literary work, in which time, and even admirable talents were wasted on inferior subjects—27th January 1844. Besides editions of the French classics, grammatical, lexicographical, and poetical works, he wrote numerous tales and memoirs. A portion of his writings was collected and published in 12 vols. at Paris, 1832–1834, under the incorrect title of "*Œuvres Complètes*."

**NOETIANS.** See PATRIPASSIANS.

**NOGENT LE ROTROU**, a town of France, in the department of Eure-et-Loir, is situated in a pretty vale on the Huise, 32 miles west-south-west of Chartres. It is a station on the Great Western Railway from Paris to Rennes in Brittany. Pop. (1872) 5984. N. is a long, well-built town, with a ruined castle in the Gothic style, the residence of the great Sully.

**NOGGING.** Brickwork built in the panels of a timber-framed house. Nogging-pieces are horizontal timbers, introduced to strengthen the brickwork.

**NOILS**, a technical term employed for the short and broken hairs which are removed from wool in the process of combing and preparing it for worsted manufactures. The noils are used for making inferior yarns, and are valuable for *setting* purposes, in which they are largely employed.

**NO'LA**, an episcopal city of South Italy, in the province of Caserta, 16 miles east-north-east of Naples, is built on the site of one of the oldest cities of Campania. The ancient N. was founded by the Ausonians, and fell into the hands of the Romans in the Samnite war, 313 B.C. For its protection, Marcellus in the second Punic war fought in its vicinity the first battles in which the Romans were victorious over Hannibal. Augustus died at Nola, 14 A.D. The first bells for Christian churches

Noli  
Nominative

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are said to have been cast here in the 5th century. See **BELL**. Numerous coins, and beautiful vases made of a pale-yellow clay, with figures painted in crimson and maroon, and supposed to have been manufactured here by potters from Corinth, have been found in the vicinity. **N.** was a flourishing city in the middle ages, and has (1871) a pop. of 9128, or with suburbs, 10,771.

**NO'LI ME TA'NGERE**, a popular name for one form of the disease which has been already described under the term *Lupus* (q. v.).

**NO'LLÉ PRO'SEQUI**, a term used in English Law to denote that the plaintiff does not intend to go further with the action, or part of the action, in which case he enters or files a memorandum, called a *nolle prosequi*, after which the action, or part of the action, is at an end on that point, and the defendant is entitled to his costs thereon.

**NOLLEKENS**, Joseph, was born in London in 1787. His father, who was from Antwerp, and by profession a painter, died when he was young, and his mother, a Frenchwoman, not remaining long a widow, he received but little education. Being placed in the studio of Scheemakers the sculptor, in Vine Street, Piccadilly, he worked hard, and made such progress, that, in 1759, the Society of Arts awarded him fifteen guineas for a group in clay; in 1760, thirty guineas for a bas-relief; and during the same year, ten guineas for a model in clay of a dancing fawn. Soon after this, **N.** set out for Rome. He was then in his twenty-third year; his purse was light, he had no patron to support him; but he was independent in spirit, and had been trained to habits of economy. A bas-relief he carved in stone brought him ten guineas from England, and the Society of Arts voted him fifty guineas for his group in marble of Timoclea before Alexander. But one of the most important events for him, after settling in Rome, was his meeting Garrick in the Vatican, who immediately recognized his countryman as the young sculptor to whom the prizes had been awarded by the Society of Arts, sat to him for his bust, and paid him handsomely for it. This was the first bust he had been commissioned to model, and it gave him the opportunity of proving where his strength lay. He also also executed in Rome a bust of Sterne in terra cotta, which added greatly to his reputation. After residing ten years in Rome, he returned to London, took a lease of extensive premises in Mortimer Street, where he set up his studio; and the reputation he had acquired in Rome was such, that he immediately had full employment, and within a year after (in 1771) was elected an Associate of the Academy, and a Royal Academician the following year. His forte was in modelling busts. Into these he infused much truth and character, and he has handed down the likenesses of most of the important personages who figured in this country in the end of the last and at the commencement of this c.—of Samuel Johnson, who was his friend and frequent visitor—of Fox, Pitt, and other political characters. George III. also sat to him; and his manner, which exhibited pretty strongly what is popularly set down as blunt and manly English character, made him a great favorite with the king. Besides busts, **N.** executed numerous commissions for public monuments and statues. He was selected by the Academy, with whom the choice lay, to execute the government commission of a monument to the three captains, Manners, Bayne, and Blair, who fell in Rodney's great battle of April 12, 1782; but in this he did not rise above the allegories of Neptune and his Sea-horse, and Britannia and her Lion. His statue of Pitt for Cambridge was much praised at the time. He also executed, either in the course of his studies, or to meet the views of those connoisseurs who advocate high art, a considerable number of classical and mythological statues and groups, a fawn, a Bacchus, five Venuses, Cupid and Psyche, Pætus and Arria, &c. He died in London, 28d April 1823. His wife, to whom he had been long married, and who had brought him some fortune, died a few years before him. He had no children, and his great wealth, upwards of £300,000, was left to certain friends, burdened with some legacies and annuities to his old assistants and servants.—See Cunningham's "Lives of British Artists," &c.

**NO'MADS** (Gr. *nomads*, to tend or feed), the name given (originally by the Greeks) to those tribes which, depending chiefly on their flocks and herds, have no fixed habitation, but move about for convenience of pasture. The nomad tribes are of a higher grade of civilisation than those that live by hunting and fishing, but

much inferior to those engaged in agriculture and manufactures. They are very generally addicted to robbery, and readily engage in aggressive war, so that they have frequently become conquerors of extensive cultivated countries, as in the instances of the Huns, Arabs, and Tartars. There are now few nomads in Europe, and these only in the steppes near the Black Sea, and the regions of the utmost north, where cultivation is impossible. Almost all the Finns, Mongolians, and Turkish tribes and the tribes formed by mixture of these races, in the steppes and deserts of Central and Northern Asia are nomads, also the Kurds and the Bedouins, many of the tribes of Africa, and the Gauchos and some of the other Indian tribes in North and South America.

**NOMBRÉ DE DI'OS**, a town of Mexico, 85 miles south-east from Durango, in a mountainous district. Near it are rich silver mines. Pop. 7000.

**NOMBRIL POINT**, in Heraldry. See **ESOUTCHEON**.

**NOME**, a term used in the ancient Greek music to denote any melody determined by inviolable rules.

**NOMINALISM**. This word refers to a celebrated controversy of the middle ages, respecting the nature of our general or abstract ideas. It was contended by some that abstractions—as a circle in the abstract, beauty, right—had a real existence apart from round things, beautiful objects, right actions. This was called Realism. Those that held the opposite view were called Nominalists, because they maintained that there is nothing general but *names*; the name "circle" is applied to everything that is round, and is a general name; but no independent fact or property exists corresponding to the name. There is nothing in a general name, they say, but a declaration of resemblance among a number of things; all things that the name is applied to, resemble one another in some point, which point of resemblance the mind can consider apart from the points of difference; this act of isolated consideration being what is called the power of abstraction. We can be engaged in thinking of the smell of a rose, we can compare it with other sweet odors, and speculate as to the nature of the material that gives the odor, or as to the pleasure that we derive from it; all this is a process of abstract thinking, but it would not of itself suffice to prove that the odor has a separate existence. We might also confine our attention to the mere form, or outline of the rose, and compare it with other forms; but we should be still less able to affirm the independent existence of this particular form.

Realism must be traced back to Plato's system of Ideas, or the eternal and independent existence of general attributes, from which the concrete embodiments were derived. There existed in the Divine Mind, according to Plato, patterns, models, or archetypes, according to which individuals were formed. The archetype circle was the origin of all actual round things. Aristotle denied the separate existence of these general forms, and held that they existed only in connection with matter, or with objects in the concrete. The Stoics repudiated universals in both senses. The Aristotelian view constituted the Scholastic Realism, and prevailed until the 11 c., when a re-action took place in favor of the Stoical doctrine, headed by Roscellin of Compiègne and John the Sophist. This was the commencement of Nominalism. The celebrated Abelard was a disciple of Roscellin, and induced large numbers to depart from the Realistic notions, which were identified at the time with religious orthodoxy. The controversy raged with great violence through the 12th century. Thomas Aquinas and Duns Scotus, in the following century, gave their powerful adhesion to Realism. In the 14th c., William Occam, an English Franciscan friar, and a pupil of Scotus, revived the advocacy of Nominalism, which was once more maintained by a number of eminent men, in spite of the hostility of the church, carried the length of persecution. The controversy subsided at the Reformation.

A middle view between Nominalism and Realism was held by a few persons when the contest was at its height; which was, that although general properties have no separate existence in nature, they can be conceived in the mind apart from any concrete embodiment. Thus we may form an idea of a circle, irrespective of any individual round body. This view is specious, and is tacitly implied in many opinions that have never ceased to be held. See **GENERALISATION**.

**NOMINATIVE**. See **DECLENSION**.

Non-Appearance  
Non-Residence

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**NON-APPEARANCE**, the term used in the Law of England to denote that a party against whom an action or suit has been commenced has not entered an appearance, which is the way by which he comes before the court to defend his right. In many cases, if he does not appear, the suit will go on in his absence, provided he was duly served with the writ of summons or bill.

**NON-ASSUMPSIT**, is in English Law the usual plea or defence to an action for breach of a contract not by deed, and means that the defendant denies that he broke the contract, or that that there was any contract.

**NON-COMMISSIONED OFFICERS**, in the British army, constitute a numerous and very important class in the regimental system between the commissioned officers and the men. As the former are not permitted to mix with the private soldiers, lest familiarity should diminish the sway of absolute discipline, it is necessary to have an intermediate class to overlook the men in their barracks and at all times when off the parade. None are so suited for this duty as the best conducted of the men themselves, who are promoted by selection to non-commissioned rank, and hold many privileges and powers unattainable by the privates. The non-commissioned officers comprise the serjeants-major, all the serjeants, the trumpeters, drummers, and buglers, and, in the Life Guards and Royal Horse Guards only, the corporals. They can be reduced to the ranks by sentence of a court-martial, or by their colonel-commandant; but not by a lieutenant-colonel nor by any junior officer. Non-commissioned officers are entitled to quarters for their wives, or lodging-money in lieu of quarters. Accustomed themselves to obey, the non-commissioned officers are admirable assistants in preserving discipline; veterans, to whom military life is a second nature, they are looked up to by their comrades as examples, to lead in battle or to teach in drill. The non-commissioned officers have a Mess (q. v.) to themselves. In a battalion of infantry at home, there were, in 1874, 58 non-commissioned officers to 590 rank and file; in India, 66 to 690; but the rank and file may be greatly augmented without affecting the number of non-commissioned officers. In the whole British army (European) for the year 1874-1875, there were 90,949 non-commissioned officers. This rank is a necessity in all armies; in France, the non-commissioned officers are termed *sous-officiers*; in Germany, *unter-offizieren*.

**NONCONFORMISTS**, a name sometimes given generally to all sectaries who, at any period in English history since the establishment of Protestantism, have refused to conform to the doctrine and practices of the Episcopal Church. It is, however, more frequently used in a restricted sense to denote the 2000 clergymen who in 1662—two years after the Restoration—left the Church of England, rather than submit to the conditions of the Act of Uniformity, which required of every beneficed minister, every fellow of a college, and even every schoolmaster, unfeigned assent to all and everything contained in the Book of Common Prayer. The ejected ministers swelled the ranks of the Presbyterians and Independents, the latter of whom are sometimes called Nonconformists.

**NON-EFFECTIVE** (Fr. *non-actif*), is the term applied to the portion of the personnel of the army or navy not on active service or in immediate readiness for active service. It thus comprises all officers on retired or half-pay, pensioners, and supernumerary officers. In a force liable to frequent augmentations and reductions, the non-effective charge must be considerable, and a large retirement is necessary, in order to rapid promotion. The great French war, also, with the reductions following it, bequeathed to the British an annual non-effective charge of several millions, which is not yet wholly expunged. In 1878-1879, the non-effective charges were £2,344,912 for the army, and £1,887,571 for the navy, being upwards of 16 per cent. on the gross cost of the two services.

**NON-ENTRY**, in the Law of Scotland, means that state of a fiefal estate when the last vassal has died, and his successor has not been invested or seised of the land. On such an occasion, the superior is entitled to what is called a casualty of non-entry, which consists of the rent of the fief.

**NON EST INVENTUS**, a technical term used in that part of the law where, after judgment, the sheriff endeavors to arrest a party. If after a reasonable search he cannot find the debtor, he makes a return to the court that he has not been able to

and the debtor, which is shortly called a return of *non est inventus*, and his duty is then discharged until a fresh writ is issued to him.

NONE (Lat. *nona*, "ninth"), one of the lesser Canonical Hours (q. v.), so called from its recitation being primitively fixed at the ninth hour.

NONES. See CALENDS.

NONFEASANCE, in certain parts of the Law of England, means the not doing what one is bound to do.

NONJOINDER, in English Law, is the omitting to join all the parties to the action or suit.

NONJURORS, the name given to that portion of the Episcopal clergy of England who at the coronation of William and Mary refused to take the oath of allegiance to these sovereigns, believing that they had unlawfully possessed themselves of the throne abdicated by James II. They were great champions of the doctrine of passive obedience on the part of subjects towards kings; and as the triumph of the Prince of Orange was obtained at the expense of that doctrine, it was impossible that they could, consistently with their antecedents, acknowledge him as their rightful king. The House of Commons allowed them six months longer than laymen to make up their minds, but declined to adopt the amendment of the Lords, viz. that the oath should not be imposed on the clergy. They refused, and were consequently deprived of their sees and benefices. The nonjurors comprised Archbishop Sancroft, 8 bishops, and about 400 of the inferior clergy.

NON-RESIDENCE, the name given in Church Law to the offence of a person holding a Spiritual Benefice who absents himself without legal justification from the local precincts within which the duties attached to the benefice are prescribed to be performed. The obligation of residence follows clearly from every principle of law, and from the constant tendency to relaxation on the part of the clergy, has been an unfailing subject of legislation, ecclesiastical and civil, from the very earliest times. The Council of Nice in 325, of Antioch in 332, and of Carthage in 401; the constitutions of the popes from the earliest genuine document of that class, the novels of Justinian, the capitularies of Charlemagne—all speak the same language, and enforce it by the same penalties. During the mediæval period, and especially during the unhappy contests of the western schism, great abuses prevailed. The whole substance of the legislation of the Roman Church on the subject, however, is compressed in the decrees of the Council of Trent, which are mainly contained in the decrees of the XXII. and following sessions, "On Reformation." The decrees of the council regard all church dignitaries, and others charged with the cure of souls. Without entering into the details, it will suffice to say, that for all the penalty of absence without just cause, and due permission, consists in the forfeiture of revenues, in a proportion partly varying with the nature of the benefice, partly adjusted according to the duration of the absence. For each class, moreover, a certain time is fixed, beyond which, during twelve months, absence cannot be permitted. The duty is imposed on persons named in the law of reporting to the ecclesiastical superiors cases of prolonged absence. The same legislation has been confirmed by most of the recent concordats, and is enforced by the civil law of each country. In England, the penalties for non-residence are regulated by 1 and 2 Vict. c. 106. Under this act, an incumbent absenting himself without the bishop's licence for a period exceeding three, and not exceeding six months, forfeits one-third of the annual income; if the absence exceed six, and does not exceed eight months, one-half is forfeited; and if it be of the whole year, three-fourths of the income are forfeited. The persons excused from the obligation of residence by the canon law are sick persons, persons engaged in teaching the theological sciences in approved places of study, and canons in immediate attendance upon the bishop ("canonici a latere"), who ought not to exceed two in number. By the act 1 and 2 Vict. c. 106, heads of colleges at Oxford and Cambridge, the wardens of Durham University, and the head-masters of Eton, Westminster, and Winchester Schools are generally exempted, and temporary exemptions from residence are recognised in other cases, which it would be tedious to detail. In the Roman Catholic Church, besides the general legislation, most of the provincial and diocesan statutes contain special provisions on the subject of non-residence.

Non-Suit  
Norfolk

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**NON-SUIT** is a legal term in England, which means, that where a plaintiff in a jury trial finds he will lose his case owing to some defect or accident, he is allowed to be non-suited, instead of allowing a verdict and judgment to go for the defendant. The consequence is, that the plaintiff has to pay the defendant's costs; but he can bring a fresh action, if he can get over the difficulty that rendered a non-suit necessary or expedient.

**NOOSSA.** See **MOLUCCAS**.

**NOOTKA DOG**, a large kind of dog, common in a domesticated state among the natives of the vicinity of Nootka Sound. It has erect, pointed ears. It is chiefly remarkable for the extreme abundance of its long woolly hair, which, when shorn off, holds together as a fleece, and is spun and woven into garments. The introduction of this wool-bearing dog into other countries has been suggested, but not yet attempted.

**NOOTKA SOUND**, an inlet on the west coast of Vancouver's Island, British North America, in lat.  $49^{\circ} 35'$  N., long.  $126^{\circ} 35'$  W. Its entrance is protected by an island of the same name, and the Sound can be entered on both sides of the island. It extends inland for 10 miles in a north-north-east direction; but the greatest breadth of water is not more than 500 yards. Numerous small coves and inlets are found around the rocky shores. It affords good anchorage.

**NORD**, the most northerly department in France (whence its name), corresponding with the former province of French Flanders, and bordering on Belgium and the Strait of Dover. Area, 2185 sq. miles; pop. (1876) 1,519,535. It is composed of two parts, or at least narrows near the middle at Armentières, on the Lys, almost to a line. It is watered by the Scheldt and the Sambre, with their affluents, and by numerous canals. Next to that of the Seine, it is the most densely peopled department in France. The soil is fertile, well cultivated, and yields more abundant harvests than any other part of the country: 883,606 acres are arable. The principal products are wheat, hemp, beet-root, vegetables, tobacco, and fruits. Manufactures of lace, cambric, linens, and beet-root sugar are extensively carried on. It has a much larger proportion of railways, roads, and canals than any of the other departments, as well as the most important coal and iron mines. No other department has so many populous towns and strong fortresses; none adds so much to the national revenue; in none are the people so intelligent, so susceptible of culture, or so industrious. In respect of its educational and benevolent institutions, as well as of its learned societies, it ranks next to the department of the Seine. The arrondissements are Lille, Douai, Cambrai, Valenciennes, Avesnes, Hazebrouck, and Dunkerque. The chief town is Lille.

**NOR'DEN**, a town of Prussia, in the province of Hanover, 72 miles north-west from Oldenburg, and a few miles from the North Sea, with which it is connected by a canal. Pop. (1871) 5952.

**NOR'DERNEY**, a small island of the Prussian province of Hanover, lies three miles off the coast of East Friesland, and forms one of a string of islands that line that coast. Area about 4 square miles; permanent pop. 1770. It has enjoyed, since 1797, a great reputation as a place for sea-bathing, and in the summer season has from 1800 to 2000 visitors. The little village at the west end of the island has a very tastefully-built *Conversations-Haus*, 150 feet long. Trees do not grow here.

**NOR'DHAUSEN**, a flourishing town of Prussian Saxony, pleasantly situated at the southern base of the Harz Mountains, on the Zorge, 88 miles north-north-west of Erfurt. The surrounding country is very fertile in corn, and in the vicinity commences the *Goldene Aue* (Golden Plain), a fertile valley watered by the Helme. It contains a gymnasium, numerous churches, one of which, St Blasius, contains two pictures by Luke Cranach. It carries on a thriving general trade, is the depot from which the Harz Mountains are supplied with necessaries, and has most extensive distilleries and considerable manufactures of tobacco, succory, chemicals, cloth, leather, &c. Its spirit distilleries, of which there are sixty in almost constant operation, produce annually for export upwards of 100,000 hogsheads of corn-brandy. Pop. (1875) 23,676.

**NÖRDLINGEN**, a town in the west of Bavaria, is situated on the river Eger, 44 miles north-west of Augsburg by the Munich and Nürnberg railway. It has a Gothic church, with a high tower and fine organ, and manufactures of Tyrolean carpets, linens, and woollens, besides a large trade in feathers. Pop. (1875) 7224. N. is historically interesting as the scene of several battles, the most famous of which was fought, 6th September, 1634, between 24,000 Swedes under Count Horn and Duke Bernhard of Saxe-Weimar, and 45,000 imperialists under King Ferdinand. The former were defeated with the loss of 12,000 killed and wounded, 300 banners and standards, 80 cannons, and several thousand prisoners, among whom was Horn himself.

**NORE** is a sand-bank in the estuary of the river Thames, 4 miles north-east of Sheerness, on which there is a floating light called the Nore light, in lat.  $51^{\circ} 29' \text{ N.}$ , long.  $0^{\circ} 48' \text{ W.}$  The name, however, is more commonly applied to the portion of the estuary in the vicinity of the Nore light and sand-bank.

**NORFOLK**, a large and important maritime county of England, bounded on the north and north-east by the North Sea, and on the south by the county of Suffolk. Area, 1,356,173 acres; pop. (1871) 433,511. Its coast-line, extending from Yarmouth, on the east, to the mouth of the Nen in the Wash, is about 100 miles in length. From Yarmouth to Happisburgh, the coast is low and sandy; from Happisburgh to Weybourne, it is skirted by low cliffs; and west of Weybourne to the Wash, where the banks are in great part dry at low-water, and where a considerable extent of land has been reclaimed from the sea (see *WASH*), it is low, and covered with sand or shingle. The surface of the county is level, or nearly so, none of the rising-grounds being considered worthy of being called hills. The principal rivers are the Ouse, the Yare, with its affluents the Wensum and the Waveney, and the Bure. Communication is kept up by the navigable rivers, and by the Great Eastern Railway. The climate is affected in spring particularly by cold north-east winds, but the air is in general dry and healthy. The soil consists chiefly of light sands and loams, and comprises a great extent of land, which, though naturally not fertile, has been made so by judicious management. The agriculture of the county is in an advanced condition, and all the usual crops are extensively grown; while that of barley is especially celebrated. Half the acreage is devoted to rearing food for cattle, and thus the necessary supply of manure is secured. Geese and turkeys are extensively reared for the London market. The county is divided into three parts, North, South, and West N., each returning two members to the House of Commons. The capital is Norwich.

**NORFOLK**, a city and port of entry of Virginia, U. S., 88 miles south-east of Richmond, and 33 miles from the ocean. The city is irregularly built on low ground, and contains a city hall, military academy, mechanics' hall, court-house, jail, custom-house, 9 banks, 26 churches. Its large deep harbor is defended by Fort Calhoun and Fortress Monroe, the largest fortress in America. A government navy yard, dry dock, and marine hospital are in the suburb of Gosport. N. was built in 1736; in 1776, it was burned by order of Lord Dunmore, the British colonial governor. In 1853, a large number of the inhabitants died of yellow fever. In 1874, the exports of N. (including Portsmouth) amounted in value to \$3,906,318 dollars; and, in the same year, the number of vessels belonging to these ports was 376. The population in 1870 was 19,229; 1880, 21,966.

**NORFOLK ISLAND** lies in the Pacific Ocean, 1100 miles east-north-east of Sydney in Australia, in lat.  $29^{\circ} 10' \text{ S.}$ , and long.  $167^{\circ} 58' \text{ E.}$  Length, 5 miles; breadth, 2½ miles; area, 6960 acres. It is the largest of a small cluster of islands, comprising N., Nepeau, and Phillip Islands, together with several rocky islets. The coasts are high and steep, and the surface generally uneven, rising in Mount Pitt to upwards of 1000 feet in height. The soil is fertile and well watered, and the climate healthy. In 1825, N. I. was made a penal settlement by the British government for the worst class of convicts sent out to New South Wales; but the experiment was a failure, and the establishment was broken up in 1855. In 1856, the inhabitants of Pitcairn Island (q. v.)—194 in number, descendants of the mutineers of the "Bonny"—were transferred hither by the British government. In 1871, the pop. was 481, the Pitcairn community numbering 297.



**Noric**  
**Normandy**

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**NORIC ALPS.** See **ALPS**.

**NOR'RIUM** is the name assigned by Svanberg to a metal, whose earth (or oxide) is associated with zirconia in certain varieties of the mineral zircon. Its existence is not as yet definitely established.

**NORMAL SCHOOLS**, institutions where teachers are instructed in the principles of their profession and trained in the practice of it. The name of Normal School is of French origin (*Ecole Normale*, from Lat. *norma*, a rule or model), and is that generally used in Scotland; such institutions, in England, are oftener called "Training Colleges;" and in Germany "Seminaries." That in acquiring knowledge the mind follows certain processes, and that any one imparting knowledge should do so in harmony with these processes, are truths which seem sufficiently obvious. It is only recently, however, that they have secured much attention; and they are even at this day deliberately denied by some men of thought, and of the highest educational position. The recognition of these truths has, however, been sufficiently extensive to secure the institution in Great Britain, America, France, Germany, and Switzerland, of schools in which the principles of teaching form the subject of study, and in which model specimens of the art are given. Italy, and even Russia, are following in the wake of the countries named. These schools also afford a thorough course of instruction in the subjects which are taught in elementary schools. The only normal school for training the higher class of teachers for colleges and academics exists in Paris.

One of the earliest, if not the earliest, normal school in Great Britain was the Sessional School of Edinburgh (1830), afterwards developed into the "General Assembly's Normal Institution." The first attempt of a similar kind in England was that of the Battersea Training College, instituted by Mr. afterwards Sir J. P. K. Shuttleworth, and Mr. Tuffnell. Sir J. P. K. Shuttleworth subsequently, acting as secretary to the Committee of Privy Council on Education, suggested measures which have resulted in the institution of about 50 colleges for the training of teachers in Great Britain in connection with the Established and Dissenting Churches. These turn out hundreds of male and female teachers annually, who having, after a two years' course of training, received government certificates of merit, become teachers of elementary schools.

There has been for some years a reaction against the necessity of normal schools, and their maintenance at the public expense. But this reaction can only be temporary, and the great facts will survive, that every subject of instruction is best taught according to a certain method, and that all methods are based on the study of the human mind. This is a position which it is impossible permanently to shake. The real founders of normal schools are those men who, with more or less clearness and width of view, have brought prominently forward these principles. Such were Plato and Quintilian, in ancient times; in more recent years, the most prominent names have been Comenius, Pestalozzi, Rousseau; and, in our own country, Ascham, Milton, Locke, Professor Pillans, and Dr Arnold.

**NORMAN ARCHITECTURE.** As its name implies, this style was originated and chiefly used by the Normans. Soon after their conquest of the north of France, they began to erect churches and cathedrals in memory of their victories. Their conquests supplied them with the means for making these large edifices. They were not contented with the small churches then common in France, but desired to erect monuments worthy of their great conquests. They accordingly expanded the dimensions, while to a great extent retaining the style of the buildings they found in France. They seem also to have borrowed some of their ideas from the Rhine. See **ROMAN ARCHITECTURE**.

The leading characteristics of their style were size and massiveness. They adopted the old Latin plan (derived from the Basilica) of central and side aisles; and at the east end, they invariably placed a semicircular apse. They seized on the tower as a distinguishing feature, and developed it as their style progressed. The ornaments are simple and of great variety; but the most common and distinctive are the zigzag, billet, chevron, nail-head, &c. The windows and doors are simple, with semicircular arched heads—the former without tracery. The tympanum of the door-arch is occasionally filled with sculpture.

The nave arches are carried sometimes on single pillars, but more frequently,

especially as the style advanced, on piers with shafts. The shafts are almost always recessed in nooks or ("nook shafts"). Owing to the great size of the buildings, the architects were unable at first to vault the main aisle, which, accordingly, had usually had a wooden roof, the side aisles only being vaulted.

The masonry is rude; the joints being large, and the stones generally unhewn. The style prevailed from about the beginning of the 10th c. till the death of William the Conqueror, near the end of the 11th century. There are many examples in Normandy, the churches at Caen being well-known buildings of the date of William.

This style of architecture was brought into England by the Normans at the Conquest, 1066. They there extended the scale of the buildings, as they had done in Normandy, preserving, however, many local peculiarities of the Saxon style, which they found in the country. The chapel in the White Tower of the Tower of London is the earliest example of pure Norman work in England. There are, however, many buildings, both in England and Scotland, which date from before the end of the 12th c., when the pointed style began to be used. Durham, Lindisfarne, Canterbury, Dunfermline are partially Norman, besides many other churches and castles. The Anglo-Norman is heavier than the French-Norman, the cylindrical nave piers of the above buildings being much more massive than those of French works. To relieve this heaviness, the chevron, spiral, and other groovings were cut in the piers. The mouldings and forms of doors, windows, &c., are the same as those of Normandy. There is one remarkable difference in the plans of the Early Norman churches in the two countries: in France, the apse at the east end is always semicircular; in England, this form was gradually given up; and towards the end of the style, the square east end was universally adopted.

**NORMANDY** (Fr. *Normandie*), formerly a province in the north of France, bordering on the English Channel; now divided into the departments of Seine-Inférieure, Eure, Orne, Calvados and Manche. It is in general a very fertile, richly-cultivated land, resembling a garden in many districts. Its chief agricultural products are corn, flax and fruits (from which cider is largely made); its fisheries and manufactures of great importance, and its horses the best in the kingdom. The inhabitants are for the most part descendants of the old Normans, and bear the stamp of their splendid ancestors. They are intelligent, strongly built, and of a noble and energetic character; warm-hearted and patriotic, they produce the boldest sailors, the most skillful fishermen, agriculturists, cattle-rearers and gardeners in all France. In the north-eastern and more level part (formerly *Upper Normandy*), the principal towns are Rouen, Dieppe, Havre-de-Grace, Harfleur, Honfleur, Lisieux, Evreux, Yvetot; in the south-western or hilly part (*Lower Normandy*), the principal towns are Caen, Falaise, St-Lo, Bayeux, Coutances, Avranches, Balonne, Alençon, Cherbourg and Mont-St-Michel.

In the time of the Romans, the country bore the name of *Gallia Lugdunensis II*. Under the Frankish monarchs it formed a part of Neustria, and was first called N. after Charles the Simple, in 912, had given it to Rolf or Rollo, the leader of a band of Norse rovers (see **NORMANS**), to be held by him and his posterity as a fief of the French crown. From Rolf (baptized into Christianity under the name of Robert) and Gisela, the daughter of Charles, sprung the later Dukes of N., of whom Richard I., grandson of Rolf, vigorously maintained his authority against his liege lords, Louis IV., and Lothaire. William II., son of Robert II., became Duke of N. in 1086; and in 1066, established a Norman dynasty on the throne of England (see **WILLIAM THE CONQUEROR**), thereby politically uniting N. with the latter country. In 1077, his eldest son, Robert, wrested N. from him, but it was again united to England under Henry I. in 1103. With this monarch, Rolf's male line became extinct. Henry II., the son of Henry I.'s daughter, Matilda, after the death of Stephen of Blois, obtained in 1154 the government of England and N.; but in the reign of his son, John Lackland, it was conquered by Philippe Auguste (1203-1204). It remained a portion of the French monarchy for more than 200 years; but after the battle of Agincourt (1415) it was reconquered by the English, who held it till 1449, when it was finally wrested from them by Charles VII. See Liquez's "*Histoire de la Normandie*" (1835); Palgrave's "*History of N. and of England*" (1851-64).

**NORMANDY**, Customary Law of (Fr. *Coutumier de Normandie*). The ancient

provinces of France were governed principally by a system of laws called *Customs*, which had originated in local usages, and been in the course of time reduced to writing and formally sanctioned by the sovereign. *Customs* was distinguished both from *loi*, which originated with the king, and from *us*, or usage not reduced to writing. Of the codes of customary law, one of the oldest and most famous was the *Customier de Normandie*. It was divided into the ancient and modern custom. The former was first reduced to a written form, in 1239, under St Louis; the latter was the ancient *coutumier*, modified and reformed in 1583, by commissioners appointed by Henry III., with the concurrence of the three estates of the nobility, clergy, and people of Normandy. The ancient *coutumier* treats principally of the duties of the judicial officers, the proceedings in the different courts, and the rights and obligations of the kings of France, the Dukes of Normandy, the feudal lords, and the people. In the modern *coutumier* are minute regulations regarding the transmission of property by will and inheritance. Each of the twenty-two vicomtés, into which N. was divided, had a different mode of devising real property. The law by which the Channel Islands are still governed is based on the customary law of Normandy. The chief judge in Jersey, Guernsey, and Alderney retains the Norman name of *bailli* or *ballif*, and his authority is much the same as that officer possessed under the Norman law. One of the most remarkable remnants of the *coutumier* still subsisting in the Channel Islands is the *Clameur de Haro*. Any one who considers that his rights of property are infringed, protests in the presence of two witnesses, and calling out three times "Haro" (said to be a way of invoking Duke Rollo, noted for his justice), summons the trespasser to desist. He then applies to the authorities, relating what he has done, and proceeds to the Record Office, where note is taken of the circumstances; all which ceremonial must be gone through before bringing an action of trespass. The decision is generally referred to *une vue de justice*, and the losing party is subjected to a fine, and liable in costs: he had formerly also to undergo *un regard de châtean*, or twenty-four hours' imprisonment, for having implored the aid of the prince without cause.

NO'RMANS (i. e., Northmen), a name generally limited in its application to those sea rovers who established themselves in that part of France called after them, Normandy; but sometimes embracing also the early inhabitants of Norway. During the middle ages, the name Northmen, or Norsemen, was often used in a broader sense, to denote the entire population of Scandinavia, and still more frequently, perhaps, to designate the Danes and Norwegians, exclusive of the Swedes. The Germans and French called the piratical hordes who ravaged their shores Normans or Northmen; the Saxons, usually Danes or Eastmen. They were also distinguished by the latter as *Mark-* or *March-men* (from *Den-mark*), as *Ash-men* (i. e., men of the *ashen-ships*), and as the *Heathen*. The primary cause of the plundering expeditions southward and westward across the seas, undertaken by the Norse Vikings (*Vikings*, meaning dwellers on the *vics*, i. e., bays or fiords), as they called themselves, under leaders, who took the name of "Sea-Kings," was doubtless the over-population and consequent scarcity of food in their native homes; besides, the relish for a life of warlike adventure, conjoined with the hope of rich booty, strongly attracted them; while—at least as long as the old Scandinavian religion lasted (i. e., till about the end of the 10th c.)—death in battle was not a thing to be dreaded, for the slain hero passed into a region of eternal strife in the Walhalla of Odin. Finally, discontent with the ever-increasing power of the greater chiefs or kings, induced many of the nobles with their followers to seek new homes.

The first Danish Norsemen made their appearance on the eastern and southern coasts of England in 787. After 882, their invasions were repeated almost every year. To one of these belongs the *legend* of Ragnar Lodbrok (i. e., Ragnar of the "Shaggy Brogues"), who is said to have been taken prisoner by Ella, king of Northumbria, and thrown into a dungeon filled with vipers, where, while expiring amid horrible torments, he sung with heroic exultation the story of his life. The very existence, however, of such a person as Ragnar Lodbrok is questioned by many Scandinavian scholars. In 851, the Norsemen wintered for the first time in the island, and after 866 obtained firm footing there. The Anglo-Saxon Ethelred I. fell in battle against them in 871. His brother Alfred, known as Alfred the Great

(q. v.), after a long and doubtful struggle, partially reduced them to subjection; nevertheless, he was compelled to leave them in possession of Northumbria and East Anglia; and had not only to defend himself against a new and fierce invasion led by the famous rover Hastings (q. v.), but like his immediate successors, to contend against the revolts of his Dano-Norman subjects. A period of external peace now ensued; but in 991 the invasions of the Danes and Norwegians began anew. The Saxon king, Ethelred II., at first sought to buy them off by paying a sort of tribute-money, called *Danegelt* (q. v.); but the massacre of the Danes living in England, by command of that monarch, 13th November 1002, was avenged by four expeditions under the Danish king, Swen, who frightfully wasted the country, and finally conquered it in 1013, dying the following year. His son Knut, or Canute (q. v.), after carrying on a struggle for the supreme power with Ethelred and his successor Edmund Ironside (q. v.), at length, on the death of the latter, became sole monarch of England, which now remained under Danish or Norse rulers till 1042. The government of the country then reverted into the Saxon hands of Edward the Confessor (q. v.), who was succeeded in 1066 by Harold II. (q. v.), son of the powerful Godwin, Earl of Wessex (q. v.); but in October of the same year, Harold lost his life and crown at the battle of Hastings, and William the Conqueror, a descendant of a Norwegian chief who had settled in Normandy, once more established a Norse dynasty on the throne of England, but one greatly refined and improved by long residence in a comparatively civilised region.

It was also Danish Norsemen, in particular, who ravaged the western coasts of the European mainland, from the Elbe to the Garonne. As early as 810, the Danish king, Gottfried, had overrun Friesland; but the power of the great Charlemagne was too much for these undisciplined barbarians, and they were overawed and subdued for a time. Soon after his death, however, they recommenced (*circa* 820) their piratical expeditions, and favored by the weaknesses and dissensions of the Carolingian rulers, became, during the 9th c., the terror and scourge of North-western Germany and France. They plundered Hamburg several times, ravaged the coasts of the Frisians (which then extended as far as the Scheldt), and in 843 firmly planted themselves at the mouth of the Loire. But ere long they ceased to be satisfied with making descents and settlements on the coasts, and in their small piratical craft they swarmed up the great rivers into the interior of the country, which they devastated far and wide. Thus, in 845, they ascended the Seine and plundered Paris—an exploit which was frequently repeated. In 885, not less than 40,000 of these Vikings are said to have ascended the river from Rouen under the leadership of one Siegfried in 700 vessels, and besieged the capital for ten months. It was only saved at the expense of Burgundy, which was abandoned to their ravages. In 881, Louis or Ludwig III., king of the West Franks, inflicted a severe defeat on the invaders at Vimen, near Abbeville in Picardy, the memory of which has been preserved in a song still popular among the country-people; but neither that, nor the repulse which they sustained from the brave German monarch Arnulf, near Louvain in 891, could hinder them from making fresh irruptions. In 892, they appeared before Bonn, and tradition says that bands of Danish rovers penetrated even into Switzerland, and established themselves in the canton of Schwyz and the vale of Hasli. From their settlements in Aquitania they proceeded at an early period to Spain, plundered the coasts of Galicia in 844, and subsequently landed in Andalusia, but were defeated near Seville by the Moorish prince Abd-ur-Rahman. During 850—960, they forced their way into the Mediterranean, wasted the shores of Spain, Africa, and the Balearic Isles, penetrated up the Rhone as far as Valence: then turning their piratical prow in the direction of Italy, entered the Tyrrhene Sea, burned Pisa and Lucca, and actually touched the distant Isles of Greece before their passion for destruction was satiated, or before they dreamed of returning west.

Doubtless Norwegian rovers also took part in these so-called Danish expeditions. We know that as early as the beginning of the 9th c. they made voyages to the north of Ireland, Scotland, the Hebrides, the Orkney and Shetland Isles; and the increasing power of Harald Haarfager in the 9th and 10th centuries, exciting great discontent among the smaller chiefs, great emigrations took place, and these islands became the new homes of these Norwegian Vikings. About the same period, colonies were settled in the Farøe Isles and Iceland, from which some Vikings

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proceeded westwards across the North Atlantic to Greenland in 982, and thence, in 1002, south to a region which they called *Vinland*, now universally believed to be the coast of New England, thus anticipating the discovery of America by Columbus by nearly 500 years. From Norway also issued the last and most important expedition against the coast of France. It was led by Rolf or Rollo, who had been banished by Harald Haarfager on account of his piracies. Rolf forced Charles the Simple to grant him possession of all the land in the valley of the Seine, from the Epte and Eure to the sea. By the time of Charles the Bald the invaders had firmly planted themselves in the country, which then went by the name of Normandy (q. v.). They and their descendants are, strictly speaking, the Normans of history—warlike, vigorous, and a most brilliant race. They rapidly adopted the more civilised form of life that prevailed in the Frankish kingdom—its religion, language, and manners, but inspired everything they borrowed with their own splendid vitality. At a later period (the 13th c.) they even developed a great school of narrative poetry, whose cultivators, the *Trouveurs* or *Trouveres*, rivalled in celebrity the lyrical Troubadours of Southern France. Their conquest of England, in 1066, gave that country an energetic race of kings and nobles, on the whole well fit to rule a brave, sturdy, but somewhat torpid people like the Anglo-Saxons. But though the Normans had acquired comparatively settled habits in France, the old passion for adventure was still strong in their blood; and in the course of the 11th c. many nobles with their followers betook themselves to Southern Italy, where the strifes of the native princes, Greeks and Arabs, opened up a fine prospect for ambitious designs. In 1059, Robert Guiscard, one of the ten sons of the Norman count, Tancred de Hauteville, all of whom had gone thither, was recognised by Pope Nicholas II. as Duke of Apulia and Calabria, and in 1071 as lord of all Lower Italy. His brother and liegeman, Roger, conquered Sicily, 1060–1089. Roger II. of Sicily united the two dominions in 1137; but in the person of his grandson, William II., the Norman dynasty became extinct, and the kingdom passed into the hands of the Hohenstauffen family.

The Swedish Norsemen directed their expeditions chiefly against the eastern coasts of the Baltic—Courland, Esthonia, and Finland, where they made their appearance in the 9th c.—the very time when their Danish and Norwegian brethren were roving over the North Sea, the English Channel, the Bay of Biscay, and were establishing themselves on the shores of England and France. According to the narrative of the Russian annalist, Nestor, they appear to have penetrated into the interior as far as Novgorod, whence they were quickly banished by the native Slavic and Finnish inhabitants, but were as quickly solicited to return and assume the reins of government. Hither, consequently, in 862, accompanied by other noted warriors, came three Swedish chiefs, Rurik, Sineus, and Truvor, sons of the same father, and belonging to the tribe of *Ros* (whence *Russ* and *Russians*). Rurik founded one kingdom at Novgorod, which stretched northwards as far as the White Sea. His successor, Oleg, united with that a second established by other Swedish adventurers at Kiev, which town now became the capital of the wide-extended Russo-Swedish kingdom. See *Russia*. For a long period these Norsemen, who, it appears, became completely identified with their Slavic-speaking subjects in the 10th c., were dangerous enemies of the Byzantine empire, whose coasts they reached by way of the Black Sea, and whose capital, Constantinople, they frequently menaced, as, for instance, in 941, when Igor is said to have appeared before the city with upwards of 1000 ships or boats. Earlier in the same century, these Swedo-Russian warriors had found their way into the Caspian Sea, and actually penetrated to the coasts of Tartary and Persia. Partly from them, and partly from native Scandinavians, came those soldiers who from the 9th to the 13th c. formed the body-guard of the Byzantine emperors.—See Deppings's "*Histoire des Expéditions Maritimes des Normands et de leur Etablissement en France au 10me Siècle*" (2 vols. 2d edit. 1843); Wheaton's "*History of the Northmen from the Earliest Times to the Conquest of England*" (1831); Worsane's "*Minder om de Danske og Normandene i England, Skotland, og Irland*" (1851); Freeman's "*History of the Norman Conquest*" (1867–1876).

**NORNE**, the *Parces* of the northern mythology. They were three young women, by name Urd, Verdandi, and Skuld—I. e., Past, Present, and Future. They sit by the Urdar-well under the world-tree Yggdrasil, and there determine the fate both of

gods and men. Every day they draw water from the spring, and with it and the clay that lies around the wells, sprinkle the ash-tree Yggdrasil, that its branches may not rot and wither away. Besides these three great norns, there are also many inferior ones, both good and bad; for, says the Prose Edda, when a man is born there is a norn to determine his fate; and the same authority tells us that the unequal destinies of men in the world are attributable to the different dispositions of the norns. These lesser norns corresponded to the *genii* of classic mythology. Women who possessed the power of prediction or magic also bore this name.

**NO'RRISTOWN**, a borough of Pennsylvania, U. S., on the north bank of the river Schuylkill, 16 miles north-west of Philadelphia, containing cotton and woollen factories, iron rolling-mills and foundries, machine-shops, court-house, jail, public library, bank, 13 churches, seminary, 5 public schools, 1 German and 7 English newspapers, and in 1880, 13,063 inhabitants.

**NO'RRKÖPING**, the first manufacturing town of Sweden after Stockholm, is the chief town of Linköping-Lan, in East Gottland, and is situated at the junction of the Motala with the Gult of Bravike, in 58° 30' n. lat., and 16° 15' e. long. Pop. in 1874, 24,365. It is a fine, well-built town, with broad streets, large squares, and numerous churches and charitable institutions. The rapid river Motala, which is spanned by several substantial bridges and lined with commodious wharfs, affords very considerable water-power, by which numerous systems of machinery are worked. The manufactures are cloths, stockings, starch, tobacco, soap, &c., while in the neighborhood are the extensive ironworks and cannon foundries of Finspång. N. is a good salmon station, and is the principal Swedish port for the importation of wines and foreign spirits.

**NORTH**, Frederic, Lord, English minister, was born April 13, 1732, and educated at Eton, and Trinity College, Oxford. His father, Baron Guilford, a descendant of Roger, Baron North (*temp.* Henry VIII.), was created an earl in 1752. N. entered the House of Commons at an early age, was made a Lord of the Treasury in 1768, and inherited the Tory politics which, in the days of Charles II., had placed his ancestor in the highest ranks of the law and the state. It was his boast in the House of Commons, that "since he had had a seat there he had voted against all popular, and in favor of all unpopular measures." On the death of Charles Townsend, in 1769, he was made Chancellor of the Exchequer and leader of the House of Commons, a post for which he was well qualified by his eloquence, good humor, wit, and readiness of resource. His folly was, however, one of the immediate causes of the American War. Earl Russell, in his "Life and Times of C. J. Fox," says that "for £100,000 a year of revenue George Grenville provoked America, and that for £16,000 a year of revenue Lord North lost America." In 1770, he succeeded the Duke of Grafton as prime-minister. As a minister he was too ready to surrender his own judgment to that of George III., who, with a narrower understanding, had a stronger will, and was determined to subdue America. N. was called by Horace Walpole the ostensible minister; the real minister was the king. N. had to encounter an ardent and powerful opposition, led by C. J. Fox and supported by Burke. It has since been proved that N. "as early as 1776 was of opinion that the system he was pursuing would end in ruin to the king and to the country." In 1778, he renounced the right of taxing the colonies. In 1782, it being impossible to carry on the war with America any longer, N. resigned. "A more amiable man never lived," says Earl Russell; "a worse minister never since the Revolution governed this country." With N.'s retirement came to an end George III.'s scheme of governing the country by his own will, and ruling the House of Commons by court favor and thinly disguised corruption. N. was succeeded by the Marquis of Rockingham, on whose death Lord Shelburne became premier. Fox's dislike of the terms of peace with America led him to enter into a coalition with N., whom he had for so many years inveighed against as a minister without foresight, treacherous, vacillating, and incapable. N. and Fox took office under the Duke of Portland in 1783, but the coalition destroyed Fox's popularity, and the Portland administration only lasted a few months. N. was afflicted by blindness during the last five years of his life. He succeeded to the earldom of Guilford, in 1790, on the death of his father, and died in August 1792.

**NORTH BERWICK.** See **BERWICK**, **NORTH**.

**NORTH CAPE.** See **MAGERÖE**.

## NORTH CAROLINA. See CAROLINA.

**NORTH-EAST AND NORTH-WEST PASSAGES.** The numerous and important discoveries made by the Portuguese and Spaniards in the southern latitudes of Asia, and the reports which, on their return, they spread of the fabulous wealth of those regions, excited the attention of the other maritime nations of Europe, and prompted them to send out expeditions to the East Indies for the purpose of obtaining a share in the lucrative traffic of which Spain had hitherto possessed the monopoly. But the latter power, then at the height of her prosperity, was not disposed to admit other nations as sharers of her good-fortune, and dealt so summarily with all intruders, having at that time the complete command of the Atlantic and Indian Oceans, that her rivals were reluctantly compelled to abandon all thoughts of trading in those seas. Unwilling, however, to lay aside their designs of opening a trade with the far-famed India and Cathay (as China was then called), they resolved to attempt to reach those regions by some other route. Two plans appeared most feasible—the one to reach Eastern Asia by coasting along the north of Europe and Asia, the *North-East Passage*; the other by sailing westward across the Atlantic. The latter was first attempted by John Cabot in 1497, but he found his progress barred by the American continent, or, at least, those parts of it known as Newfoundland and Labrador. Three years afterwards, Gaspard Cortereal and his brother made three several voyages in the same direction; and on reaching Newfoundland, sailed northwards, but were stopped on the coast of Labrador, in lat. 60° n. Both brothers afterwards perished, with all their followers. Several voyages were soon after made to discover if a passage for ships existed to the north of America (the *North-West Passage*), but without success; and the hardships which navigators were subjected to in these inhospitable climes, caused the abandonment for the time of all further investigations in that direction.

*North-East Passage.*—The search for a North-East Passage was now vigorously prosecuted, and England had the honor of sending out the first expedition for this purpose in 1553. It consisted of three ships, commanded by Sir Hugh Willoughby, and was fitted out under the direction of the celebrated Sebastian Cabot; but on rounding the North Cape, one of the ships was separated from the others during a violent storm, and subsequently entered the White Sea, then unknown to western Europeans. The other two, under Willoughby, drifted hither and thither in the vast waste of water surrounding the pole, till the navigators sighted Nova Zembla. Being unable to land, they sailed back along the north of Russia, and took up their winter quarters on the coast of Russian Lapland, where they were subsequently found frozen to death. Several other expeditions were, at different times, sent out by the English and Dutch, but none of them ever succeeded in penetrating further than the east coast of Nova Zembla, though they rendered good service to geography by making accurate surveys of Northern Europe and the adjacent islands of Spitzbergen, Nova Zembla, Waygatz, &c. It was for a long time believed that the promontory which forms the eastern boundary of the gulf of Obi was the *Tabis* of Pliny, and formed the north-east corner of Asia; and this opinion, which received the assent of the celebrated Gerard Mercator, tended greatly to encourage renewed explorations, as, according to it, the eastern coast of Asia was not more than 400 miles from Nova Zembla. The following is a list of the chief expeditions for the discovery of the North-East Passage:

Willoughby and Chancellor.....	English.....	1553
Barnroughs.....	".....	1556
Pet and Jackman.....	".....	1580
Barentz, William (three expeditions).....	Dutch .....	1594–1596
Hudson, Henry, {first expedition.....	English.....	1603
{second expedition.....	Dutch .....	1609
Wood.....	".....	1676

In his third expedition Barentz nearly reached icy Cape, about long. 100° e, but was, with his crew, imprisoned by the ice, and died before the return of spring. Various important discoveries were made during this expedition, which proved that in favorable seasons a passage could be found to the eastward, but after the subsequent failures of Hudson and Wood, the attempt was abandoned in despair. The Russian government now took up the search, and both by overland expeditions, and by vessels

starting from various points on the north and east coasts of Siberia, sought to discover a practicable passage. The chief of these expeditions were those of Behring in 1741, which started from Petropavlovski, and was stopped at the East Cape; of Shaloroff; and of Billings. In 1875, and again in 1876, Professor Nordenskiöld reached the eastern shores of the Gulf of Obi; and in July 1878 a well-equipped Swedish expedition, under that veteran explorer, attempted once more the n. e. passage. The party successfully rounded Cape Chelyuskin, and in September were able to start from the mouths of the Lena for Behring's Strait.

*North-West Passage.*—As was formerly mentioned, Sebastian Cabot and the brothers Cortereal were the first who attempted to double the north coast of America; Cabot had reached as far north as lat.  $67^{\circ} 30'$ , in the strait between Greenland and America, but the courage of his crew failing, he was compelled to return. Notwithstanding his urgent representations, he was unable to prevail upon the English monarch to send out another expedition, and it was not till after several unsuccessful attempts had been made to find a North-East Passage that investigations of the north coast of America were resumed. As these investigations were carried on till within the last few years solely by the English, their prosecution till a definite result was arrived at came to be looked upon as a point of national honor, and repeated expeditions were sent out long after it had been clearly shewn that a North-West Passage, when found, would be useless in a mercantile point of view. In all, more than 200 voyages were made in search of the North-West Passage, so that only the most important of them can be even mentioned. The first expedition, after that of Cabot, was sent out in 1576, under Martin Frobisher, who made a second and third voyage in the two following years, but without any important discovery. In 1585—1588, northern enterprise received an impetus from the successful expeditions of Captain John Davis. This navigator sailed up the strait which bears his name, as far as lat.  $72^{\circ}$  north, and reported open sea still further north; he then surveyed the east and west sides of the strait, but without further important results. Henry Hudson (q. v.), who had previously attempted the North-East Passage, followed in 1610, and discovered the Hudson Strait and Bay, believing the latter to be none other than an inlet of the Pacific Ocean, an opinion which was proved erroneous by the investigations of Button in 1612; the latter, however, disseminated on his return the equally erroneous opinion that the bay was closed in on all sides, with the exception of the two eastern entrances. Button's account was not universally credited, and accordingly in 1615, Captain Bvlor, who had been one of Hudson's company, was sent out, accompanied by Baffin, the most skilful navigator and scientific observer of the time; but their first expedition, which was to Hudson's Bay, was devoid of results. In their next voyage (1616), they sailed up Davis' Strait, reaching lat.  $78^{\circ}$  n., and satisfying themselves by a very superficial investigation that there was no northern outlet, the bay (as it was then believed to be) was named in honor of its explorer Baffin's Bay. On their return southwards, they coasted along the west side, and discovered an opening to the west which they named Lancaster Sound, but believing it to be only an inlet, did not explore further. On his return, Baffin gave it as his decided opinion that no outlet to the west existed from Baffin's Bay, and the attention of explorers was again directed to discover an outlet from Hudson's Bay. In 1619, the solitary attempt by foreign powers to aid in the search was undertaken by Jens Munk, a Dane, but he made no discoveries, and the attempt was not renewed. The expedition of Fox and James, in 1681, led to the partial exploration of the channel since known as the Fox Channel, which forms the northern outlet to Hudson's Bay, and from this time the spirit of discovery slumbered till 1741. Between this date and 1746, several expeditions were sent out to discover an outlet from the north-west corner of Hudson's Bay, but their united researches satisfactorily proved that no such outlet existed. Owing to these disappointments, the search for a North-West Passage was discontinued for more than half a century, notwithstanding the fact of the British parliament having promised a reward of £20,000 to the fortunate discoverer. In 1818, the Admiralty took up the search, and sent out Captain John Ross and Lieutenant Parry, who sailed up Davis' Strait, and ascended Lancaster Sound for thirty miles; here Captain Ross gave up the search, considering it to be hopeless. But this opinion was by no means coincided in by Parry, who was accordingly sent out in the following year, and succeeded in far outstripping all his predecessors in the career of northern dis-



covery. He entered Lancaster Sound on 30th July, and a few days afterwards discovered a large inlet, thirty miles broad, which he named Prince Regent Inlet. After exploring this inlet for some distance, he returned, and continued his course westward, as the ice allowed him, passing through a strait which he named after Sir John Barrow, the promoter of the expedition. Continuing his westward course, he reached long.  $110^{\circ}$  w., in Melville Sound, where he was stopped by the ice; and after wintering here, and giving names to the numerous islands, seas, and straits he had discovered, returned to Britain, with the glory of having advanced  $80^{\circ}$  of longitude further west than any previous explorer. On his arrival, he was welcomed with the utmost enthusiasm, and his discoveries imparted renewed energy to the half-dormant maritime enterprise of the British. There was now no doubt in what direction the North-West Passage was to be sought, but Parry's second expedition (1821—1823) was for the purpose of determining whether the Fox Channel was connected with the Arctic Sea of his previous voyage; it was, however, unsuccessful. A little before this time, the coast-line of North America from Behring's Strait to Point Turnagain, in long.  $109^{\circ}$  w., had been fully traced, so that it only remained to find some navigable passage from Regent Inlet to this point, and the long-wished-for result would be attained. For this purpose, Captain John Ross was sent out with an expedition in 1829, and after a laborious and difficult voyage up Prince Regent Inlet, reached a point only 200 miles from Point Turnagain. It was during this voyage that he discovered the magnetic pole. Dease and Simpson, in 1836, extended the survey of the American coast from Point Turnagain to within 90 miles of the magnetic pole, but the hopes of a channel between these points were dashed by the discovery made by Dr. John Rae, in 1847, that Boothia (the land which bounds Regent Inlet on the west) is a peninsula of the American continent. We now come to the unfortunate expedition of Sir John Franklin, which, it was fondly hoped, would settle the question of a North-West Passage. It sailed from England, May 19, 1845, and was last seen in Baffin's Bay. Franklin is believed to have sailed through Lancaster Sound, and ascended Wellington Channel to lat.  $77^{\circ}$  n., and thence returned southwards, crossing Barrow Strait, and sailing down the channel (now called Franklin Channel) which separates North Somerset and Boothia Felix from Prince of Wales Island to the west, where, in lat.  $70^{\circ}$  n., long.  $95^{\circ} 30'$  w., his ships were beset with ice, 12th September 1846, and Franklin died 11th June 1847. The survivors abandoned the vessels 20 miles southwest of this point, and perished in the attempt to reach the American mainland. Many expeditions were sent out to search for the missing voyagers, and one of these expeditions, under Collinson and McClure, sailed from Plymouth, 20th January 1850, and reached Behring's Strait in August the same year. Sailing eastward the following spring, McClure's ship became fixed in the ice, about 60 miles west of Barrow Strait, and the crew were picked up by Sir Edward Belcher, who had been sent out in April 1852 to their assistance. Belcher, who had reached Melville Sound by the eastern passage through Lancaster Sound and Barrow Strait, returned the same way; and thus McClure and his company enjoyed the envied honor of being the only ship's crew who had ever penetrated from Behring's Strait to Baffin's Bay. To McClure, then, belongs the honor of having finally set at rest all doubts as to the existence of a North-West Passage. By the various English and American expeditions (1843—1859) sent out to search for Sir John Franklin, the whole region to the north of the American mainland as far as lat.  $77^{\circ}$  n., and long.  $160^{\circ}$  w., has been thoroughly explored, and various channels of communication between Davis' and Behring's Straits have been discovered, such as the route by Hudson's Bay, Fox Channel, Fury and Hecla Strait and Bellot Strait, into Franklin Channel, and thence by either the McClintock or the Victoria Channel, or the routes by Lancaster Sound, and the McClintock Channel, Prince Regent Inlet, or Prince of Wales Strait, to the open sea n. of Alaska, but all these routes are useless in a mercantile point of view. See POLAR EXPEDITIONS.

**NORTHERN LIGHT-HOUSES.** Commissioners of, the body corporate which has under its management the whole of the light-houses of Scotland and Isle of Man. The body was first constituted by act of parliament 26 Geo. III., but has been frequently since the subject of legislation. The light-houses of the Isle of Man were assigned to it in 1815. By the Merchant Shipping Act, 1854, the Commissioners are so far limited in their powers, that any proposal for a new light-

house must receive the approval of the Trinity House, London, and the outlay must be sanctioned by the Board of Trade; the cost, however, is borne by the Imperial light-house fund. The Commissioners act wholly in virtue of office, and give their services gratuitously. The body consists of the Lord Advocate, Solicitor-General, Lord Provost and senior Bailie of Edinburgh; Lord Provost and senior Bailie of Glasgow; Lord Provost of Aberdeen; provosts of Inverness, Campbellton, Dundee, and Greenock; the sheriffs of the following counties—Aberdeen, Argyre, Ayr, Berwick, Bute, Caithness and Sutherland, Edinburgh, Elgin, Fife, Forfar, Haddington, Inverness, Kincardine, Lanark, Orkney and Shetland, Renfrew, Ross, Wigtown, and Kirkcubright. The business of the Commissioners is conducted at an office in Edinburgh, with the assistance of a secretary and consulting engineers. In 1877, the number of light-houses under charge of the commission was 60, besides buoys and beacons. The Commissioners own a steam-vessel, the "Pharos," for supplying stores to the several light-houses, and performing annual visits of inspection. The whole system of northern lights is remarkably well organised, the merit of which is in a great measure due to the late Robert Stevenson (q. v.). A Royal Commission appointed some years ago to inquire into the management of the English, Irish, and Scottish light-houses, has acknowledged that the "Scotch light-houses are in the best state of general efficiency, the English next, and the Irish third."

**NORTH SEA** (ancient *Germanicum Mare*; Ger. *Nord See*), that arm of the Atlantic Ocean which separates the British Islands on the west from the continent on the east. It is 700 miles in extreme length (from north to south), about 400 miles in greatest breadth, and has an area of not less than 140,000 square miles. The great commercial highways from the N. S. to the Atlantic are by the Pentland Firth and the Strait of Dover; while on the east it communicates with the Baltic by the Skagerrack, the Cattagat, Sound, and Great and Little Belts. Along its south-eastern and southern coasts the shores are low, and are skirted by sand-banks, formed by the sand deposits carried to the sea by the waters of the Elbe, Weser, Rhine and Scheldt, which are the principal rivers that flow into this sea from the east. The shores of England, especially in the south, are also low, and here sand has also accumulated, though not nearly to the same extent as on the continental coasts. The chief British rivers that fall into the N. S. are the Thames, Ouse, Humber, Tyne, Tweed, Forth, and Tay. Besides the sand-banks on the coast already referred to, there are others extending to the middle of the sea-bed, similar in their origin to those on the coasts, and occupying altogether about three-fourths of the entire area. Of these, the principal are the bank running north-east from the mouth of the Firth of Forth for 110 miles; the one extending north-west from the mouth of the Elbe for about the same distance; the Doggerbank (q. v.). &c. These sand-banks, combined with the storms and fogs so common in the N. S., render its navigation unusually dangerous. Another peculiarity of the bed of this sea is, the number of extraordinary "holes" which have been found in it. Of these the most remarkable are the Little Silver Pitt off Holderness in Yorkshire, and the North-north-east Hole, 8 leagues further east. Little Silver Pitt is 25 miles in length, and from half a mile to two miles in width. At its edges there is a depth of from 60 to 80 feet of water, but the "hole" has a depth of 380 feet. In the north, along the Norwegian coasts, the shores are steep and rocky, and there is a depth of about 190 fathoms. The depth (31 fathoms on an average) increases from south to north. The currents of this ocean are extremely various, and demand the greatest caution on the part of the navigator. Owing to the prevalence of south-west winds, the currents shew a general tendency towards the north-east. On the south-western coast of Ireland, the great tidal wave of the Atlantic is broken into two portions, one of which, coursing up the Channel, passes through the Strait of Dover; while the other, sweeping north, passes round the north of Scotland, and then southward along the east coast of Britain, and meets the southern wave off the coast of Essex. The northern portion of the tidal wave spreads over the whole of the German Ocean, and though on its entrance into the N. S. it is only 12 feet in height, it rises in its progress southward, as the sea becomes narrower, in the same way as the bore (q. v.) is formed in a contracting estuary. In the estuary of the Humber it rises to the height of 20 feet. This sea yields immense quantities of fish, the most important kinds being cod, hake, ling, turbot, sole, mackerel, and herring, also lobsters. The fisheries employ many thousand people. On all available points of the coasts, light-houses have been

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erected, and there are numerous floating light-vessels moored to detached banks. The traffic on the N. S. is enormous. It is surrounded by countries whose inhabitants have from the earliest times been famous on the seas, and the enterprise and national bias that formerly covered the Scandinavian waters with conquering fleets, may now be traced in the vast commercial intercourse carried on on the North Sea.

**NORTH WALSHAM**, a small market-town of England, in the county of Norfolk, on an acclivity on the right bank of the Ant, 14 miles north-north-east of Norwich. Its market-cross, repaired after the great fire in 1800, by which the town was almost entirely burned down, dates from the reign of Edward III. Pop. (1871) 2842.

**NORTH-WEST PROVINCES**, a great political division of British India (see INDIA), between Nepal and Oude on the north-east, and Rajpootana and the Indore Agency on the south-west, consisting of seven subordinate divisions—Meerut, Kanmaon, Rohilkand, Agra, Jhansi, Allahabad, and Benares. Each of these divisions comprises from three to six districts. They are treated under separate articles. The area of the North-West Provinces is 81,408 square miles, and the population in 1873 amounted to 30,781,204. The capital is Allahabad.

**NORTHALLERTON**, capital of the North Riding of Yorkshire, a market-town and parliamentary borough, 250 miles north-north-west of London, and 30 miles north-north-west of York by railway. It stands near the left bank of the Wike. It contains a large number of public schools and other institutions. Manufactures of linen and leather, brick-making, and malting are carried on on a limited scale. Pop. (1871) of parliamentary borough, 4961, who send a member to the House of Commons. The battle of the "Standard," so called from a huge standard erected on a car by the English, was fought here, August 23, 1138, between the English under the Earls of Albemarle and Ferrers, and the Scotch under King David. The latter were defeated, and forced to retreat with great loss.

**NORTHAMPTON**, a village of Massachusetts, U. S., 1 mile west of the Connecticut River, 95 miles west of Boston, on the Connecticut River Railway. It is celebrated for its beautiful scenery, Mounts Tom and Holyoke rising from a picturesque valley. It contains many elegant residences, the county buildings, 6 banks, several academies, 11 churches, 1 cotton factory, 2 silk factories, 3 paper-mills. A bridge, 1080 feet long, connects it with Hadley. Pop. (1870) 10,160; (1880) 12,172.

**NORTHAMPTON**, capital of the county of the same name, a market-town, and parliamentary and municipal borough, on a rising-ground on the left bank of the Nen, 67 miles north-west of London by railway. In the centre of the town is a spacious market-square. The principal edifices are the shire-hall, the new and handsome town-hall, the corn exchange, the numerous churches, several of which are unusually interesting, as St Peter's, a recently restored and beautiful specimen of enriched Norman, and St Sepulchre's, much improved in 1865, one of the very few round churches in the empire, and referred to the 12th century. The hospitals of St John and St Thomas were religious houses prior to the Reformation. Boot and shoe-making, which affords employment to about 8000 persons, is the principal branch of trade carried on here. Leather is made, and hosiery and lace are manufactured. Iron and brass foundries are in operation, and brewing is carried on. Two markets are held here weekly, a general one on Wednesday, and one for cattle on Saturday. Pop. (1871) of parliamentary borough, 44,871, who return two members to parliament.

N., a very ancient town, was held by the Danes at the beginning of the 10th c., and was burned by them in 1010. After the Conquest it was bestowed on Simon de St Liz. Its castle was besieged by the barons in 1215, during the civil wars of King John. It was the scene of a great battle fought (July 10, 1460) during the Wars of the Roses, between the rival houses, in which the Earls of March and Warwick defeated the Lancastrians.

**NORTHAMPTONSHIRE**, a central county of England, bounded on the w. by the counties of Warwick, Leicester and Rutland, and on the s. w. by Oxfordshire. Area, 699,912 acres; pop. (1871) 243,891. Its surface is marked by gently undulating hills, alternating with well-watered vales. The chief rivers are the Nen and the Welland, both of which flow north-east, and fall into the estuary of the Wash. The county is traversed by the London and North-Western, the Great Northern, the

Eastern Counties, and other lines of railway, and communication by water is maintained by the Union, Grand Junction, and other canals, as well as by the rivers. The climate of the county is mild and healthy; the soil, a black mould in the fen districts in the north-east, and a brown loam on the uplands, is very productive. White and green crops are abundantly produced, and on the rich pastures cattle are extensively reared for the London market. Four members are returned to the House of Commons for the county.

**NORTHUMBERLAND**, the most northern county of England, is bounded on the e. by the North Sea, and on the n. w. by the Scottish counties of Roxburgh and Berwick. Area, 1,290,312 statute acres; pop. (1871) 336,646. The surface of the county has a rugged, and especially in the west and south-west a naked and barren aspect. The Cheviots run along the western border of the county, and send out spurs toward the east, which, gradually declining, are separated by fertile valleys, that widen as they approach the coast. About one-third of the area of the county is occupied by moorland, and along the Cumberland border the broken and bleak-looking hills are valuable for their lead-mines. Allenheads, the centre of the lead-mining district, is the highest inhabited spot in England, being 1400 feet above sea-level. The inclination of the surface toward the east is indicated by the direction of the rivers Alue, Coquet, and North Tyne, which with the Tyne and Till are the principal rivers of the county. The Tweed forms the boundary of the county on the north for about 5 miles, and the south boundary is formed in part by the Derwent and Tyne. The climate is cold, but is milder on the coast than amid the hills, which, however, produce sufficient herbage for the maintenance of large flocks of "Cheviot" sheep. The principal agricultural tracts occur along the coast, and inland along the river valleys for several miles. In these districts, the soil, for the most part, is a strong fertile clayey loam, productive in wheat, barley, beans, and clover. Agriculture is pursued on the most improved methods, and cattle, chiefly short-horned, are extensively reared. The south-east portion of the county forms a part of the great Northumberland and Durham coal-field, which produces about 25,000,000 tons annually. There are upwards of 100 pits in operation in the county. N. is traversed by the Newcastle and Carlisle, North-Eastern and Border Counties Railways. The county returns four members to the House of Commons; the county town is Alnwick (q. v.).

**NORTON**, Andrews, Rev, American scholar and theologian, was born at Hingham, Massachusetts, December 31, 1786. Having graduated at Harvard College in 1804, he was appointed, in 1809, a tutor of Bowdoin college, and in 1811 mathematical tutor at Harvard, and in 1813 librarian of the university, and succeeded Dr Channing as lecturer on biblical criticism and interpretation. In 1819, he was appointed Dexter Professor of Sacred Literature, which office he retained until failing health compelled his retirement in 1830. Dr Norton was, after Dr Channing, the most distinguished exponent of Unitarian theology, a clear and perspicuous lecturer, an able and conservative critic, and a voluminous writer. Rejecting the doctrine of the Trinity, and protesting against Calvinism, he also opposed the school of Theodore Parker and the naturalistic theology. Besides his contributions to the "General Repository and Review," the "North American Review," "Christian Examiner," he published (1833) "A Statement of Reasons for not believing in the Doctrine of the Trinity;" (1837) "The Genuineness of the Gospels;" (1839) "On the Latest Forms of Infidelity;" and left some poems and a translation of the gospels. He died at Newport, Rhode Island, September 18, 1853.

**NORTON**, the Hon Caroline Elizabeth Sarah, a poetess and novelist of some reputation, the daughter of Thomas, and the granddaughter of Richard Brinsley Sheridan, was born in 1808. Her father died while she was still a child, and her education, which embraced an unusually varied course of studies, was superintended by her mother. In 1827, she married the Hon George Chappel Norton. In 1831, she first met Lord Melbourne, then prime-minister, and the intimacy which succeeded having given rise to some scandalous rumors, Mr Norton brought an action against Lord Melbourne, which resulted in a verdict for the defendant. She died 15th June 1871, after having been for some months the wife of Sir W. Stirling Maxwell. Her chief works are "The Sorrows of Rosalie" (1829); "The Undying One" (1830); "The Child of the Islands" (1845); "Stuart of Dunleath," a novel (1847); "English

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Laws for Women in the Nineteenth Century" (1854); "The Lady of Garaye" (1862); "Lost and Saved," a novel (1863); and "Old Sir Douglas" (1866). Her prose works, several of which depict the wrongs incident to the position of women, are written with considerable cleverness and vigor; and her verse, though overstrained and staid in sentiment, has numerous admirers, and manifests some degree of that brilliancy for which the Sheridans have been so famous.

NORWALK, a township of Connecticut, U. S., on both sides of the mouth of Norwalk River and Long Island Sound, on the New York and New Haven Railway, 45 miles north-east of New York, and 31 south-west of New Haven. It has manufactures of iron, machinery, hats, felt-cloth (of which two companies make 500,000 yards per annum), 16 churches, &c. Pop. (1870) 12,119; (1880) 13,956.

NORWAY (Norweg. *Norge*), the western portion of the Scandinavian peninsula, which, together with Sweden, forms one joint kingdom, is situated between 57° 56' and 71° 10' n. lat., and between 5° and 28° e. long. It is bounded to the e. by Sweden and Russia, and on every other side is surrounded by water, having the Skagerrak to the s., the German Ocean to the w., and the Arctic Sea to the n. Its length is about 1100 miles, and its greatest width about 250 miles; but between the lat. of 61° and 68°, it measures little more than 25 miles in breadth. The following table shows the areas and populations of the 20 åmter into which N. is divided, as given in the last census of January 1876:

ÅMTER.	Area in Eng. Sq. Miles.	Population in 1876.
Smaalene.	1,543	107,629
Akershuus.	1,936	114,778
Christiania.	2	77,941
Hedemarken.	10,034	119,774
Christians.	9,670	115,263
Buskerud.	5,659	101,847
Jarlsberg and Laurvik.	861	89,299
Bratsberg.	5,707	83,966
Nedre.	3,865	75,979
Lister and Mandal.	2,423	77,306
Stavanger.	3,421	114,164
Søndre Bergenhuus.	5,364	121,597
Bergen (town of).	1	34,834
N. Bergenhuus.	7,045	86,205
Romsdal.	5,650	116,583
S. Trondhjem.	7,064	116,814
N. Trondhjem.	8,794	81,839
Nordland.	14,660	108,579
Tromsø.	9,720	53,937
Finmarken.	18,306	24,233
Total.	122,280	1,517,257

Of this total, only 332,933 live in towns. At the preceding census on Dec. 31, 1863, the population was 1,701,756.

The Scandinavian peninsula consists of more or less connected mountain masses, which, in the southern and western parts of N., constitute one continuous tract of rocky highlands, with steep declivities dipping into the sea, and only here and there broken by narrow strips of arable land. South of Trondhjem (63° n. lat.), the ridge expands over nearly the entire breadth of Norway. The northern portions of the range, known as the Kjöllefjelle,\* occupy a space of about 25 miles in width, and form, as far north as 69°, the boundary-line between Sweden and Norway. South of 63° n. lat., the range of the Scandinavian mountains is known as the Norska, or Dovre Fjelle, although the latter name belongs properly only to the part immediately in contact with the Kjöllefjelle. The general elevation of the Norska Fjelle does not rise

\* Fjelle is the plural of fjeld, a mountain-side.

above the line of perpetual snow, whose average height in these latitudes is 5000 feet; but it ranges above that of the growth of trees, which may be stated to lie 1000 feet lower. Only two carriage-roads traverse the Norska Fjelle, the one connecting Christiania with Bergen, and the other with Trondhjem. The Justedal glacier, in Bergen amt, is the largest on the continent of Europe, and covers an area of 588 sq. miles. The whole of the west coast of N. is densely fringed with islands and insulated rocky masses, which, north of 68°, in the Lofoden (q. v) group, assume larger dimensions, and form extensive insular districts. The more important are Hindø (357 sq. m., 8190 inhabitants), on the borders of Nordland and Tromsø; Langø (147 sq. m., 5912 inhab.); Karmø (only 21 sq. m., although the pop. is 11,827); and Senjen (273 sq. m., with 3339 inhab.). To the south of the Anden group, near the little islands, Moeken and Værø, occurs that eddying whirl of counter-currents known to us as the Maelström; but with this and a few other similar exceptions, no serious obstacles impede navigation along the numerous channels of the coasts. The most important of the rivers are the Glommen (350 miles long, with a basin of 6657 sq. miles), the Drams-elv, of less than half the length and basin, Tanen, Pasvikel, Skiens, Laagen, and Vornen. These and numerous other streams are of more importance for floating down timber to the fjords than for navigation. The fjords or inlets form a characteristic feature of Norwegian scenery, and give a coast-line of upwards of 800 miles.

The most considerable of the lakes of N. is the Mjøsen, near Christiania; but even this lake, which in some places is more than 1400 feet deep, is scarcely 60 miles long, and has an area of less than 200 sq. miles. Swamps and morasses, which occupy a large area, have of late years engaged the attention of the government, which is endeavoring to drain and utilise them for agricultural purposes, and with a view of converting them into fields of turf and peat for fuel.

*Climate, Soil, &c.*—The peculiar physical character of N. necessarily gives rise to great varieties of climate in different parts of the country. The influence of the sea and of the Gulf Stream, and the penetration into the interior of deep inlets, greatly modify the severity of the climate, more especially on the west coast. Thus, while the mean annual temperature is for Christiania, on the east coast, 41°, it is 46°-8 Fahr. for Bergen on the west coast, which is only 30' further north. On the coast generally, rain and fogs prevail; while in the regions near the North Cape, storms are almost incessant. In the interior, the air is clear and dry, and the winters are cold and the summers hot, while on the coasts the opposite conditions prevail. The longest day, which in the south is 18 hours, may be said to be nearly three months in the high latitudes of the northern districts, where the longest night lasts almost an equal length of time. The protracted winter of the northern regions follows almost suddenly on the disappearance of the sun, when the absence of solar light is compensated for by the frequent appearance of the aurora borealis, which shines with sufficient intensity to allow of the prosecution of ordinary occupations.

It is estimated that 1-39th of the area of N. lies within the region of perpetual snow, while elevations exceeding 2000 feet above the level of the sea are unfitted for human habitations, although for a portion of the brief summers, the herdsmen can occupy *ætre* or huts at elevations of 3000 feet and upwards. A large extent of the mountain districts yields no produce beyond scanty grasses, mosses, lichens, and a few hardy berry-yielding plants. Only birch and juniper grow north of 67°, which is the boundary of the pine. The Scotch Fir, *Pinus sylvestris* (Norwegian, *Furn*), and Spruce, *P. abies* (Norwegian, *Gran*), cover extensive tracts, and with birch, constitute the principal wealth of Norway. The hardier fruits, as strawberries, gooseberries, cherries, and raspberries, are abundant and excellent of their kind. Hemp, flax, rye, oats, and barley are grown as far north as 66°; but although agriculture has been more systematically pursued of late years, the crops are not always sufficient for home consumption, and hence it is found absolutely necessary annually to import considerable quantities of corn and potatoes. The frugal peasantry do not, however, rely wholly upon importation, but prepare a species of cake or bread from the bark of the pine when corn is scarce, and in plentiful years store away some of the produce of the harvest in the national corn-magazines, which are established in every part of N. by way of a provision for an unfavorable season. Agriculture is most successfully prosecuted in the amts of Jarleberg and Laurvik, and in the south generally; while in the northern parts, in the upper valleys, the rearing of cattle constitutes an important branch of industry. The herds and flocks are driven

from the distant farms to the pasture-lands in these high mountain valleys, known as Sæterdale, where they remain till the approach of cold weather obliges the herdsmen to return with their charges to the shelter of the farms. Although the cattle and horses are small, they are generally strong and capable of bearing much hard labor.

*Products, &c.*—Fish are caught in almost every stream and lake of the interior, as well as in the fjords of the coast, and in the bays and channels which encircle the numerous islands skirting the long sea-line of Norway. Salmon, herring, and cod are of the greatest importance, and together give occupation to upwards of 50,000 men, who pursue the herring and cod fishing in the spring, and again in the summer, while cod is also fished in the winter-time. The value of the fish, fresh and dried, exported from N. in 1870, was 7,981,000 sp. d.,\* although that year was unfavorable in regard to the returns of deep-water fish. The average annual value of the fish and oil produce is between 9 and 10 millions of sp. d. In 1869 there were 88,000 men employed in the herring fisheries, and the value of the fish for that year was 250,000 sp. d. In the same year 15 Norwegian ships were engaged in the Jan Mayen (70° n. lat.) seal fisheries, when 33,000 young and 29,000 old seals were taken, and the profits of the captures were 45,000 sp. d. Next to the fisheries, N. derives its greatest sources of wealth from the produce of its woods. In 1870 there were 850,000 tons weight of timber (both deals and unhewn trunks) exported, of the net value of 7,600,000 sp. d. Within the last few years the Norwegian forests have yielded a new product of industry, known as wood-paste, extensively employed in the manufacture of paper, for which it promises to serve as a cheap and efficient substitute for rags.

The fauna of N. includes the bear, wolf, lynx, elk, otter, reindeer, red-deer, seal, the eider-duck, and many other kinds of sea-fowl, blackcock, capercaillie, and a great variety of small game. According to the census of 1865, there were in N. 149,167 horses, 953,036 horned cattle, 1,705,394 sheep, 290,935 goats, 96,166 swine, 101,768 reindeer.

The mineral products, which comprise silver, copper, nickel, cobalt, iron, chrome ironstone, &c., yield a large annual return. The value of the metal exports was, in 1870, 835,000 sp. d. for raw and partially worked ores, and 16,000 sp. d. for wrought metals. The richest mines are situated in the south, and chiefly in the district of the Glommen, as the celebrated and ancient silver-works of Kongsberg, the copper mines of Røraas, Alten, and Vigsnes, the nickel mines of Modum and Bamble, and the cobalt-works of Buskerud, and the numerous iron shafts on the southern declivities of the mountains between Kongsberg and the Glommen. Latterly, however, some productive copper-works have been opened in the northern districts of Kaafjard in Finmark.

Ship-building in all its branches is almost the only industrial art that is extensively and actively prosecuted. In many parts of the country there are absolutely no special trades, the inhabitants of the small fishing-ports, no less than the inmates of the widely separated farms, employing their compulsory leisure during the long winter in weaving, spinning, and making the articles of clothing and the domestic implements required in their households.

*Trade, &c.*—The principal seats of trade are Christiania, Drammen, Arendal, Bergen, Stavanger, and Trondhjem. The merchant fleet numbered, in 1874, 7447 vessels of 1,920,000 tons, manned by 56,147 seamen. In 1873, 13,404 vessels cleared the ports of N. The exports, which consist mainly of timber, fish, minerals, furs, feathers, and down, amounted in 1873 to 83,957,000 sp. d., or about £7,000,000; while the imports for the same year were 45,859,000 sp. d., or £10,300,000 sterling. The value of the exports to Great Britain in 1877 was £5,295,000, the imports thence being valued at £1,723,000. The imports consist not only of the ordinary colonial goods, and objects of luxury, but in a large proportion of the most necessary articles of consumption, as cereals to the annual amount of 2,000,000 tons, salt in nearly half that quantity, fresh and salted meat, butter, soap, hemp, and flax, sailcloth, tow, oil, wine, tobacco, and manufactured goods of all descriptions. The most important commercial relations of N. are with Great Britain and Germany. Russia and Denmark stand next in order as importers to N., while the Catholic countries of the Mediterranean are the principal purchasers of the smoked and dried Norwegian fish.

\* The specie daler is worth about 4s. 6d.

*Revenue, &c.*—By the budget for 1876-77, the revenue was estimated at 89,200,000 kroner (the *krona*, worth 1s. 1½d., having in 1875 superseded the old *specie-daler*), or about £2,190,420, the expenditure being presumed to equal the receipts. The national debt of N. amounted in 1875 to 48,307,600 kroner.

*Administration, &c.*—N. is divided into 20 units, or administrative circles, as given in the table preceding. These circles are subdivided into 56 *fogderier* (bailliwicks), each presided over by a rural magistrate, and containing in all 446 herreder, or administrative districts, which have similarly their own judicial or official heads. N. has a representative government, based on the constitution which was established in 1814, and ratified at Eidsvold. The Storting, or legislative chamber, meets annually, and is composed of representatives who are elected by deputies who have been selected for the purpose of nominating the members. These deputies are elected by a system of almost unrestricted universal suffrage, the only qualifications necessary being the attainment of the age of 25, and the possession of property in land to the value of 150 sp. d., or a five years' tenancy of such property. The election of the deputies takes place every third year, when the electors meet in their respective parish churches, and choose deputies, whose number is in the proportion of 1 to 50 voters for towns, and 1 for 100 in rural districts. These deputies then select from their own body, or from among other eligible persons, the representatives for the Storting, which is further subdivided into two distinct chambers, the Lagthing and Odelsting, with the former of whom rests the framing of legislative and financial measures, and with the latter the power of accepting or rejecting them, and the right of taking cognizance of the conduct of the ministers, judges, and other officers of the state. The members of the Storting receive an allowance for their time and travelling expenses during the session. The Storting votes the taxes, which are collected by officers of the king of Sweden and N.; it proposes laws, which must be ratified by the king; but if they pass the Storting three times, they acquire validity even without the king's sanction. Although N. constitutes one joint kingdom with Sweden in regard to succession, external policy, and diplomacy, it is in all other respects an independent state, having its own government, legislative machinery, finances, army, and navy. The king is indeed commander-in-chief of all the forces of the country, whether military or naval; but he can neither augment or decrease their number, nor proclaim peace or war without the assent of the Norwegian Council of State, which must consist of ten members, natives of the country; nor, excepting in time of war, can he bring foreign soldiers within the frontiers, or send native troops out of Norway. In accordance with the constitution, no title can be conferred independently of the tenure of office, and no one can be raised to the rank of a noble; while with the death of the members of the few still surviving noble families who were born before 1821, all personal honors, privileges, and distinctions belonging to nobility will cease. The constitution may therefore be regarded as purely democratic in its character. The Council of State constitutes the highest court of justice, under whose jurisdiction the provincial magistrates or *amtmaend* administer justice, in conjunction with the bailiffs and *sorenskriver* or advocates, who preside over petty rural courts. These lower courts are controlled by the *Stift* or Diocesan Courts of Justice; while the latter are, in their turn, under the High Court of Appeal, or *Høieste Ret*, which is located at Christiania.

*Religion, &c.*—The Lutheran is the predominant church, to which all persons holding public offices of trust must belong, although freedom is allowed to all other Christian denominations and to Jews. The church is under the administration of six bishops, whose sees are Christiania, Christiansand, Trondhjem, Bergen, Hamar, and Tromsø. There are 80 deaneries, 437 higher rectories, and 900 parish and district, town and country churches in all. There were, in 1870, 532 beneficed clergymen, and 337 theological candidates without fixed preferment. The whole number of dissenters in that year did not exceed 5200. The clergy, who receive tithes, exercise considerable influence in remote country districts, where they frequently are called upon to settle disputes, and exercise various judicial functions. Much has been done of late years in N. for the diffusion of knowledge, and provision is now made to extend education to the inhabitants of the most inaccessible districts by means of itinerant teachers, a certain number of whom, corresponding to the number of farms in each parish, are nominated to the office of schoolmaster. These men proceed



from house to house, being supplied with a schoolroom, and fed and entertained by each householder in succession for the number of days at which the farm is mulcted; and by the aid of these means, education is so universally diffused that it is rare to meet with Norwegians who cannot read and write. In 1869, there were 150 higher poor schools, 15 normal schools for the parish-school teachers, 96 higher private schools, 16 military, naval, and navigation schools, and 12 polytechnic institutions. The expenses incurred for education were, for the country districts, 365,000 sp. d., and for the towns, 111,387 sp. d. The university of Christiania (q. v.), which was founded in 1811, has 47 professors, and is attended by about 1000 students, amongst whom are the sons of many of the peasant land-owners, who receive a university education without intending to follow the learned professions.

*Army, &c.*—By the terms of the laws of 1866 and 1876, the army of N. is composed of troops of the line, the military train, the militia or *Laudevaern*, the civic guards, and the Landstorm, or final war-levy. In 1876, the troops of the line numbered 12,000 men and 750 officers. All young men above twenty-one years of age are liable to serve, with the exception of the inhabitants of the three northern parts of the kingdom. The fleet numbered, in 1876, 123 vessels, of which 32 were steamers, carrying 156 guns. The navy was manned by 2400 sailors, but the number of men liable by law to be called upon for naval service in the maritime districts of N. exceeds 60,000. Horten, in Christiania-Fjord, is the principal naval port. The only fortified spots are Fredericksteen at Frederickshald, Frederickstad, Akershus, Bergenshus, Munkholm, and Vardöhus.

The population of N. is chiefly rural, only about 11 per cent. living in towns. Christiania, the principal city, has 77,000 inhabitants, while Bergen and Trondhjem have respectively only 34,000 and 22,500. The physical character and consequent climatic relations of N. leave a very small proportion (according to some writers, only about 2 per cent.) of the area capable of being cultivated. There are few villages, and the isolated farmsteads are often separated from one another by many miles. The cultivators of the land are in most instances also the proprietors, less than one-third of the whole number being tenants only. Allodial land, known as *Udal* or *Odel*, does not descend to the eldest son unconditionally, since all his relatives have a claim upon it, and if it should be sold, have the right of buying it back within the term of five years at the sale-price.

*Roads, Railways, &c.*—The public roads in N. are excellent; and travelling is rendered cheap and expeditious by the system established and regulated by law, in accordance with which carriages and horses are provided at fixed rates of payment for travellers passing through the rural districts of the country. This system, which is known as "*Skyds*," is completely under the control and direction of the authorities, by whom the number of the guest-houses and stations are regulated. The length of the railways in N. in 1876 was about 340 miles; the length of the telegraph-lines was 4050 miles; and the number of letters that passed through the post in 1875 was 8,764,000.

*Race, Language, &c.*—With the exception of some 20,000 Lapps and Finns, living in the most remote northern regions, the inhabitants of N. are generally a pure Scandinavian race, akin to the North Germanic nations of Aryan descent. The genuine Norwegians are of middle height, with strong, well-knit, muscular frames, of fair skin, with light flaxen or yellow hair, and blue eyes. In character, they may be said to be frank, yet cautious and reserved, honest, religious, and superstitious, more from an inveterate love of clinging to the forms, thoughts, and creed of their ancestors, than from fanaticism. Their love of country, and the irrepressible fondness for the sea, by the very anomaly which these apparently contradictory propensities exhibit, shew them to be the true descendants of the sea-roving Northmen of old. Of late years, emigration has continued steadily to increase at a rate which threatens to be a serious evil to so badly populated a country as N., but which is easily explained by the small portion of land capable of cultivation. The general diffusion of education, and the perfect equality and practical independence which they have known how to secure and retain for themselves, notwithstanding their nominal incorporation with the other Scandinavian kingdoms, give to the poorest Norwegians a sense of self-respect and self-reliance which distinguish them favorably from those of the same class in other countries. The peasants, more especially in the most remote from towns, retain their ancient provincial costumes, which are, for the most

part, highly picturesque, consisting, among the women, of ample woollen skirts and brightly-colored knit bodices, fastened and adorned with silver or brass clasps and buckles. Music is much cultivated by all classes of the people, and the national songs and melodies which are the favorites, are for the most part of a melancholy character.

Danish is the language in ordinary use both in writing and speaking, although dialects nearer akin to the old Norse are spoken by the dalesmen and mountaineers of special districts. Since the separation of the country from Denmark, a strongly national tendency has been manifested by some of the best Norwegian writers, and attempts have been made to reorganise these dialects into one general Norwegian language, and thus, in fact, to revive the ancient Norse, or Icelandic, which has been preserved in Iceland in almost perfect purity since its first introduction to the island in the 9th c. by colonists from the Scandinavian mother-lands. Among the most zealous cultivators of the ancient and modern literature and history of N., we may instance Professor P. A. Munch, whose able expositions of the laws and social conditions of his country have thrown new light on its history; Keyser, Unger, and Hohnboe, who have done much to elucidate the Norse tongue and literature; A. Munch, Bjerreguard, Hansen, and Welhaven the critic, successful cultivators of the national lyric; J. Moe and Asbjørnsen, collectors and annotators of native sagas; Iben the dramatist, and Bjørnsen the delineator of national peasant life. In the more abstruse departments of mathematical and physical science, Norwegians have gained for themselves a foremost place, as is sufficiently testified by the mention of names such as N. H. Abel, renowned for his discoveries in definite integrals; C. Hansteen, the astronomer; and Keilhan, the geologist.

*History.*—The early history of N. is comprised in that of the other Scandinavian countries, and is, like theirs, for the most part fabulous. It is only towards the close of the 10th c., when Christianity was introduced under the rule of Olaf I., that the mythical obscurity in which the annals of the kingdom had been previously plunged begins to give place to the light of historical truth.

The introduction of Christianity, which was the result of the intercourse which the Norwegians had with the more civilised parts of Europe, through their maritime expeditions, destroyed much of the old nationality of the people with the heathenism which they had hitherto cherished, although the sanguinary feuds which had raged among the rival chiefs of the land can scarcely be said to have lost their ferocity under the sway of a milder religion. Olaf II., or the Saint (1015—1030), who zealously prosecuted the conversion of his countrymen, raised himself to supreme power in the land by the subjection of the small kings or chieftains, who in the times of heathenism had subdivided the kingdom among them. The war between Olaf and King Knud the Great of Denmark, which terminated in 1030 with the battle of Stiklestad, in which the former was slain, brought N. under the sway of the Danish conqueror; but at his death in 1036, Olaf's son, Magnus I., recovered possession of the throne, and thenceforth, till 1319, N. continued to be governed by native kings. The death in that year of Hakon V. without male heirs, threw the election of a new king into the hands of the national assembly, who, after many discussions, made choice of Magnus VIII. of Sweden, the son of Hakon's daughter. He was in turn succeeded by his son Hakon, and his grandson Olaf IV., who having been elected King of Denmark in 1376, became ruler of the sister Scandinavian kingdoms on the death of his father in 1380. This young king, who exercised only a nominal sway under the guidance of his mother, Queen Margaret, the only child of Valdemar III. of Denmark, died without heirs in 1387. Margaret's love of power and capacity for government brought about her election to the triple throne of the Scandinavian lands, and from this period till 1514, N. continued united with Denmark; but while it shared in the general fortunes of the latter state, it retained its own constitutional mode of government, and exercised its right of electing to the throne, until, like the sister-kingdom, it agreed of its own free will to relinquish this privilege in favor of hereditary succession to the throne. See DENMARK, HISTORY OF. The Napoleonic crisis may be said to have severed this union, which had existed for more than 400 years, for Denmark, after having given unequivocal proofs of adhesion to the cause of Bonaparte, was compelled, after the disastrous war of 1813, to purchase peace at the cost of this long united partner of her state. Crippled in her resources, and almost a bankrupt,

Norway  
Nose

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she saw herself constrained to sign the treaty of Kiel in 1814, by which it was stipulated by the allied powers that she should resign N. to Sweden, receiving in return, by way of indemnity, some portion of Swedish Pomerania and the island of Rügen, which were subsequently exchanged with Prussia for Lauenburg on the payment by that state of two million rix-dollars. The Norwegians, having refused to admit the validity of the treaty of Kiel, nominated Prince Christian, the heir-presumptive to the throne of Denmark, regent and subsequently king of Norway. This nomination was made by the national diet, or Storting, which met at Eidsvold, where they drew up a constitution based on the French constitution of 1791. These measures found, however, neither supporters nor sympathisers among the other nations; and with the sanction of the great allied powers, Charles John Bernadotte, Crown-Prince of Sweden, led an army into N., and after taking Fredericksstad and Fredericksahald, threatened Christiania. Denmark being unable to support the cause of Prince Christian, and N. being utterly destitute of the means necessary for prosecuting a war, resistance was of no avail, and the Norwegians in this untoward conjuncture of affairs, were glad to accept the proposals made to them by the Swedish king for a union with Sweden, on the understanding that they should retain the newly promulgated constitution, and enjoy full liberty and independence within their own boundaries. These conditions were agreed to, and strictly maintained; a few unimportant alterations in the constitution, necessitated by the altered conditions of the new union, being the only changes introduced in the machinery of government. Charles XIII. was declared joint king of Sweden and N. in 1818, and while the latter has become an almost independent state, it is questionable whether the former has found in its nominal acquisition an equivalent for the loss of Finland, which was the price exacted for it by the allied powers, and made over to Russia. Since the union, N. has firmly resisted every attempt on the part of the Swedish monarchs to infringe upon the constitutional prerogatives of the nation; and during the reign of the first of the Bernadotte dynasty, the relations between him and his Norwegian subjects were marked by jealousy and distrust on both sides; but, since his death, the people generally have been more contented, and N. has continued to make rapid progress towards a state of political security and material prosperity far greater than it ever enjoyed under the Danish dominion. —See T. Thorlak, "*Historia rerum Norvegicarum*" (Copenh. 1711); Schöningh, "*Norges Riges Historie*" (Soroe, 1771); Munch, "*Det Norske Folk's Historie*," Bd. 1-6 (Christ. 1852-1859); "*Bidrag til Norges Officiela Statistik*," 1871.

NORWAY HADDOCK. See BERGYLE.

NORWICH, a city of England, capital of the county of Norfolk, and a county in itself, on the Wesum, immediately above its confluence with the Yare, 20 miles west of Yarmouth, and 98 miles north-north-east of London. It covers an area about five miles in circumference, is skirted on its north and east sides by the river, and on the west and south it was formerly surrounded by walls, the last vestiges of which have been recently removed in order to make room for the extension of the city. The market-place (800 feet long by 340 feet wide) and its vicinity contain many large shops and good houses. The castle, finely situated on an elevation near the centre of the town, originally covered, with its works, an area of about 23 acres. The bridge (150 feet long) over the ditch has one of the largest and most perfect Anglo-Norman arches remaining. The massive quadrangular Norman keep is now used as a prison. The cathedral, almost wholly Norman in plan, was founded in 1094 by Bishop Herbert Losinga. It is 411 feet long, 191 feet broad at the transepts, and is surrounded by a spire 315 feet high. Near the cathedral are a number of ancient and interesting structures now more or less in ruins, among which may be mentioned St Ethelbert's and the Erpingham Gate, the former in Decorated English, the latter in late Perpendicular, and both valuable and rich specimens of their styles. Besides a large number of dissenting chapels and other places of worship, there are about 40 churches, of which St Peter's Mancroft, a handsome cruciform edifice of the 15th c., with a remarkably fine peal of 12 bells; St Andrew's, St Clement's, St George's, St Giles, St Michael's, and others, are worthy of mention. The Free Grammar School, with an endowment of about £200 a year, was founded by Edward VI., and the other educational establishments are numerous and various in character. The public library contains 20,000 volumes, and the library of the Norwich Literary

Institution, 15,000 volumes. N. is the seat of extensive and flourishing manufactures, the chief of which are baudanas, bombazines, shawls, crapes, gauzes, damasks, camlets, and muslins; shoemaking is extensively carried on; yarn and silk mills are in operation, and employ many hands. Iron-founding, tanning, dyeing, malting, &c., and agricultural implement-making, are also carried on. The trade, which is facilitated by a canal and river system of communication with the sea, is chiefly in agricultural produce and coal. N. is the see of a bishop, and returns two members to parliament. Pop. of municipal and parliamentary borough in 1871, 80,386.

About three miles south of N. is Caistor St Edmunds, which, prior to the Roman era, was called Caister, and under the Romans received the name of *Venta Icenorum*. N., which occupies a place in history from the time of the earlier Danish invasions, had its origin in the castle erected as a stronghold by the East Anglian kings, and resorted to as a place of safety by the inhabitants of *Venta Icenorum*, who gave it the name of North-wic, or northern station or town, on account of its relative position with respect to their own town. The bishopric of the East Angles was removed hither in 1094. About 4000 Flemings settled at N. in the reign of Elizabeth, and greatly increased the prosperity of the town by the branches of manufacture which they introduced.

**NORWICH**, a city of Connecticut, U. S., at the head of navigation of the Thames River, 13 miles north of New London, and 38 south-east of Hartford. The chief portion of the city lies on an eminence that rises between the Yantic and Shetucket rivers, which here unite to form the Thames. There are numerous manufactories of cotton, wool, paper, &c., which are supplied with water-power by falls of 50 feet on the Yantic river. N. contains county buildings, 7 banks, 1 daily and 3 weekly papers, 16 churches, 40 public and 5 private schools, and a free academy. N. was settled in 1639, when 9 sq. m. were bought for £70 of Uncas, an Indian chief, whose grave is in the city. Pop. (1870) 16,653; (1880) 21,143.

**NORWICH** or Mammaliferous Crag, a series of highly fossiliferous beds of sand, loam, and gravel, of Pleistocene age, occurring at several places within a few miles of Norwich, where they are popularly named "Crag." They contain a mixture of marine and fresh-water mollusca, with ichthyolites and bones of mammalia. They are evidently estuary beds, the most common shells being the very species now abundant in such situations around the coasts of Britain; but with them are associated a few extinct species. The beds rest on the white chalk, the surface of which is frequently perforated by *Pholas crispata*, the shell still remaining at the bottom of the cavity. The mammalian bones belong to species of elephant, horse, pig, deer, and field-mouse. With them are occasionally found the bones of *Mastodon angustidens* and some mollusca, which belong to the Red Crag. Their occurrence here is believed to have arisen from their having been washed out of the Red into this, the Norwich Crag.

**NORWOOD**, Upper and Lower, are two villages in Surrey, England, with a station on the London and Croydon Railway, 6 miles south of London. The public pleasure-ground, called the Beulah Spa, is prettily laid out around a mineral spring. The villages are worthy of mention, however, chiefly on account of their schools, among which are a district school for the pauper children of Lambeth parish, and a very large and important educational establishment for the pauper children of London. The district parish of N. had, in 1871, a population of 12,536.

**NOSE, AND THE SENSE OF SMELL.** The nose is not only the organ of smell, but is likewise a part of the apparatus of respiration and voice. Considered anatomically, it may be divided into an external part—the projecting portion, to which the term *nose* is popularly restricted; and an internal part, consisting of two chief cavities, or *nasal fossae*, separated from one another by a vertical septum, and subdivided by spongy or turbinated bones projecting from the outer wall into three passages or *meatuses*, with which various cells or *sinuses* in the ethmoid, sphenoid, frontal, and superior maxillary bones communicate by narrow apertures.

The external portion of this organ may be described as a triangular pyramid which projects from the centre of the face, immediately above the upper lip. Its summit or root is connected with the forehead by means

of a narrow bridge, formed on either side by the nasal bone, and the nasal process of the superior maxillary bone. Its lower part presents two horizontal elliptical openings, the *nostrils*, which overhang the mouth, and are separated from one another by a vertical septum. The margins of the nostrils are usually provided with a number of stiff hairs (*vibrissæ*), which project across the openings, and serve to arrest the passage of foreign substances, such as dust, small insects &c., which might otherwise be drawn up with the current of air intended for respiration. The skeleton, or framework of the nose, is partly composed of the bones forming the top and sides of the bridge and partly of cartilages, there being on either side an upper lateral and a lower lateral cartilage, to the latter of which are attached three or four small cartilaginous plates, termed *sesamoid cartilages*; there is also the cartilage of the septum which separates the nostrils, and in association posteriorly with the perpendicular plate of the ethmoid, and with the vomer, forms a complete partition between the right and left nasal fossæ. It is the lower lateral, termed by some writers the alar cartilage, which by its flexibility and curved shape forms the dilatable chamber just within the nostril. The nasal cartilages are capable of being slightly moved, and the nostrils of being dilated or contracted by various small muscles, which it is unnecessary to describe. The integument of the nose is studded with the openings of sebaceous follicles, which are extremely large and abundant in this region. The oleaginous secretion of these follicles often becomes of a dark color near the surface; and hence the spotted appearance which the tip and lower parts of the sides, or *ala*, of the nose frequently present. On firmly compressing or pinching the skin of these parts, the inspissated secretion is forced out of the follicles in the form of minute white worms with black heads.

The *nasal fossæ*, which constitute the internal part of the nose, are lofty, and of considerable depth. They open in front by the nostrils, and behind they terminate by a vertical slit on either side in the upper part of the pharynx, above the soft palate, and near the orifices of the eustachian tubes, which proceed to the tympanic cavity of the ear.

The mucous membrane lining the nose and its cavities is called *pituitary* (Lat. *pituita*, slime, rheum), from the nature of its secretion; or *Schneiderian*, from Schneider, the first anatomist who shewed that the secretion proceeded from the mucous membrane, and not, as was previously imagined, from the brain; it is continuous with the skin of the face at the nostrils, with the mucous covering of the eye through the lachrymal duct (see *EYE*), and with that of the pharynx and middle ear posteriorly. This membrane varies in its structure in different parts of the organ. On the septum and spongy bones bounding the direct passage from the nostrils to the throat, the lining membrane is comparatively thick, partly in consequence of a multitude of glands being disseminated beneath it, and opening upon it, but chiefly, perhaps, from the presence of ample and capacious submucous plexuses of both arteries and veins, of which the latter are by far the more large and tortuous. These plexuses, lying as they do in a region exposed more than any other to external cooling influences, appear to be designed to promote the warmth of the part, and to elevate the temperature of the air on its passage to the lungs. They also serve to explain the tendency to hemorrhage from the nose in cases of general or local plethora. In the vicinity of the nostrils, the mucous membrane exhibits papillæ and a scaly epithelium, like the corresponding parts of the skin. In the sinuses, and in all the lower region of the nose, the epithelium is of extreme delicacy, being of the columnar variety, and clothed with cilia. In the upper third of the nose—which, as the proper seat of the sense of smell, may be termed the *olfactory region*—the epithelium ceases to be ciliated, assumes a more or less rich sienna-brown tint, and increases remarkably in thickness, so that it forms an opaque soft pulp upon the surface. It is composed of an aggregation of uncleated particles, of nearly uniform appearance throughout, except that the lowest ones are of a darker color than the rest, from their containing a brown pigment in their interior. Dr Todd and Mr Bowman remark, in their "Physiological Anatomy," from which we have condensed the above account of the nasal mucous membrane, that the olfactory region abounds in glands, apparently identical with sweat glands, which dip down in the recesses of the submucous tissue among the ramifications of the olfactory nerve.

The nerves of the nose are the first pair or olfactory which are specially connected with the sense of smell, branches of the fifth pair which confer ordinary sen-

sibility on its skin and mucous membrane, and motor filaments, from the facial nerve to the nasal muscles. The olfactory nerve on each side is connected with the inferior surface of the Brain (q. v.) by an external, a middle, and an internal root, which unite and form a flat band (or, more correctly, a prism), which, on reaching the cribriform plate of the ethmoid bone, expands into an oblong mass of grayish-white substance, the *olfactory bulb*. From the lower surface of this bulb, are given off the *olfactory filaments*, fifteen or twenty in number, which pass through the cribriform foramina, and are distributed to the mucous membrane of the olfactory region. These filaments differ essentially from the ordinary cerebral nerves. They contain no white substance of Schwann, are not divisible into elementary fibrillæ, and resemble the gelatinous fibres in being nucleated, and of a finely granular texture. The branches of the fifth pair (or trifacial) given to the nose are the nasal nerve (derived from the ophthalmic division), which supplies the skin and mucous membrane in the vicinity of the nostrils, and the naso-palatine nerve (derived from Meckel's ganglion, which is connected with the superior maxillary division), which supplies the mucous membrane on the spongy bones and on the septum. The peculiar sensation that precedes sneezing is an affection of the nasal nerve, and the flow of tears that accompanies a severe fit of sneezing is explained by the common source of this and the lachrymal nerve; while the common sensibility of the nose, generally, is due to the branches of this and of the naso-palatine nerve.

The nature of odorous emanations is so little known, that it is impossible to give a definite account of the mode in which they produce sensory impressions. From the fact that most odorous substances are volatile, and *vice versa*, it may be presumed that they consist of particles of extreme minuteness dissolved in the air; yet the most delicate experiments have failed to discover any loss of weight in musk, and other strongly odorous substances, after they have been freely evolving their effluvia for several years. But whatever may be the nature of the odorous matter, it is necessary that it should be transmitted by a respiratory current through the nostrils to the true olfactory region, whose membrane must be in a healthy condition. If it is too dry, or if there is an inordinate excretion of fluid from its surface (both of which conditions occur in catarrh or cold in the head), smell is impaired or lost, in consequence of the necessary penetration of the stimulating odor to the nervous filaments being prevented.

The acuteness of the sense of smell is far greater in many of the lower animals (dogs, for example) than in man, and they employ it in guiding them to their food, in warning them of approaching danger, and for other purposes. To civilised man its utility is comparatively small; but it is occasionally much increased when other senses are deficient. In the well-known case of James Mitchell, who was deaf and blind from his birth, it was the principal means of distinguishing persons, and enabled him at once to perceive the approach of a stranger. Amongst many savage tribes the sense is almost as acute as in many of the lower mammals. For example, the Peruvian Indians are able, according to Humboldt, to distinguish in the middle of the night, whether an approaching stranger is a European, American Indian, or Negro.

Although all poisonous gases are not odorous, and all bad odors may not be positively deleterious to health, there can be no doubt that one of the principal objects for which the sense of smell is given to us is to enable us to detect atmospheric impurities, many of which are of a most noxious character, and give rise to the most serious forms of fever.

**NOSE-RING.** See RING.

**NOSING**, the projecting edge of a moulding, such as the bead or bottle used on the edge of steps, to which the term is most frequently applied.

**NOSOLOGY** (Gr. *nósa*, disease) is that branch of the science of medicine which treats of the distribution and arrangement of diseases into classes, orders, &c. Many systems of nosology have at different times been adopted; some of which have been based upon the nature of the ascertained causes of diseases; others on the pathological states or conditions which attend diseases; others on the differences between structural and functional diseases, &c. It is hard to say which is the most perfect method; but that of Dr Farr, one of the most distinguished living medical statisticians, is adopted by the Registrar-General in the Reports on the mortality of London and

England, and is becoming more generally adopted than any other. It has the advantage over the antiquated but once popular system of Cullen (1792) of meeting the requirements of modern science, and (by illustrating great questions connected with public health) of shewing those causes that are injurious or fatal to life, and of thus contributing to the removal of those evils (bad drainage, imperfect ventilation, &c.) which tend to shorten human existence.

We append Dr Farr's system of nosology, which is arranged in four primary classes, each of which includes various orders:

**CLASS I. ZYMOTIC DISEASES** (Gr. *zymē*, a ferment).—Diseases that are either epidemic, endemic, or contagious, and that are induced by some specific body, or by want of food or by its bad quality. In this class there are four orders—viz., Order I. *Miasmatic Diseases* (Gr. *miasma*, a stain), such as small-pox, measles, scarlet-fever, diphtheria, typhus and typhoid fevers, cholera, ague, &c. Order II. *Enthetic Diseases* (Gr. *enthēos*, put in or implanted), such as syphilis, gonorrhœa, glanders, hydrophobia, malignant pustule, &c. Order III. *Dietic Diseases* (Gr. *diaita*, way of life or diet), such as famine, fever, scurvy, purpura, rickets, bronchocele, delirium tremens, &c. Order IV. *Parasitic Diseases*, such as scabies (or itch), and worm diseases from animal parasites, and ring-worm, scald-head, &c., from vegetable parasites or fungi.

**CLASS II. CONSTITUTIONAL DISEASES**.—Diseases affecting several organs, in which new morbid products are often deposited; sometimes hereditary. This class contains two orders. Order I. *Diathetic Diseases* (Gr. *diathēsis*, condition or constitution), including gout, anæmia, cancer, melanosis, lupus, &c. Order II. *Tubercular Diseases*, such as scrofula, phthisis, mesenteric disease, tubercular meningitis, &c.

**CLASS III. LOCAL DISEASES**.—Diseases in which the functions of particular organs or systems are disturbed or obliterated with or without inflammation; sometimes hereditary. This class includes eight orders. Order I. *Brain Diseases* (or more correctly, *Diseases of the Nervous System*), such as apoplexy, paralysis, epilepsy, chorea, hysteria, mania, &c. Order II. *Heart Diseases* (or more correctly, *Diseases of the Circulatory System*), such as pericarditis, endocarditis, aneurism, angina pectoris, atheroma, phlebitis, varicose veins, &c. Order III. *Lung Diseases* (or more correctly, *Diseases of the Respiratory System*), such as bronchitis, pneumonia, pleurisy, asthma, emphysema, laryngitis, &c. Order IV. *Bowel Diseases* (or more correctly, *Diseases of the Digestive System*), such as stomatitis, gastritis, enteritis, peritonitis, jaundice, &c. Order V. *Kidney Diseases*, such as Bright's disease, nephritis, ischuria, diabetes, stone, gravel, &c. Order VI. *Genetic Diseases* (or *Diseases of the Generative System*), such as hydrocele, ovarian dropsy, &c. Order VII. *Bone and Muscle Diseases*, such as caries, necrosis, exostosis, synovitis, muscular atrophy, &c. Order VIII. *Skin Diseases*, such as urticaria, eczema, herpes, impetigo, acne, lichen, prurigo, &c.

**CLASS IV. DEVELOPMENTAL DISEASES**.—Special diseases, the incidental result of the formative, reproductive, and nutritive processes. It contains four orders. Order I. *Developmental Diseases of Children*, such as malformations, idiocy, teething, &c. Order II. *Developmental Diseases of Women*, such as amenorrhœa, childbirth, change of life, &c. Order III. *Developmental Diseases of Old People*, such as old age, and its concomitant affections. Order IV. *Diseases of Nutrition*, such as atrophy, debility, &c.

**NOSSI-BÉ**, Nossi-Barin, Varion-Bé, or Helleville, an island on the north-west coast of Madagascar, at the mouth of the Bay of Pasaondava, and separated from the mainland by a narrow channel. It is about 74 sq. m. in extent; its coast-line is very much indented; and its surface much diversified. The highest hill is 1700 feet in height, and is clothed to the summit with magnificent trees; but much of the island has a bare aspect, the forests having been cut down in order to the cultivation of rice. The soil is very fertile, and rice, maize, manioc, bananas, &c., are produced far beyond the wants of the inhabitants. The soil is volcanic, and there are several old craters filled with water. Nossi-Bé has been in the hands of the French since 1840, and is regarded by them as an important possession, on account of an old claim which they suppose themselves to have to Madagascar. There is on this island a small town called Helleville, with a harbor well sheltered from the north and east winds. There is good anchorage also at several other parts of the coast. The pop. of the island is about 6000.

**NOSSI-IBRAHIM**, or *Sainte Marie*, an island on the east coast of Madagascar, and separated from it by a strait of about 5 miles in width. It is about 40 miles in length from north-north-east to south-south-west, but only a few miles in breadth. It is one of the much-prized possessions of the French on the coast of Madagascar, has been in their hands since 1760, and is their chief place of commerce on that coast. The soil is generally arid, and the climate moist and unhealthy. Rain is of extreme frequency. The pop. of the island is about 6000. It contains a small town called *St Louis*—a seaport, and fortified. All the French possessions on the coast of Madagascar were placed by an imperial decree of 1851 under one government, that of the Comoro Isles (q. v.).

**NO STOC**, a genus of plants of the natural order *Algæ*, suborder *Conferveæ*, found upon moist ground, rocks near streams, &c., and consisting of a somewhat gelatinous hollow tumid frond, filled with simple filaments resembling strings of beads. *N. commune* is frequent in Britain, springing up suddenly on gravel-walks and pasture-grounds after rain. It is a trembling gelatinous mass, often called *STAN JELLY*, and vulgarly regarded, owing to the suddenness with which it makes its appearance, as having fallen from the skies, and as possessed of important medicinal virtues. *N. edule* is employed in China as an article of food.

**NOSTRADAMUS**, a celebrated astrologer of the 16th c., born 14th December 1503, at *St Remi*, in Provence. His proper name was *Michel Notre-Dame*, and he was of Jewish descent. He studied first at the *Collège d'Avignon*, where he exhibited remarkable scientific powers, and subsequently attended the celebrated school of medicine at *Montpellier*. Here he first acquired distinction during an epidemic that desolated the south of France, by his humane attentions to those stricken by the pestilence. After taking his degree, he acted for some time as professor, but was induced by his friend *J. C. Scaliger* to settle in *Agén* as a medical practitioner. After travelling for some time, he finally settled at *Salon*, a little town situated in the environs of *Aix*, about 1544. Already he must have been reckoned a man of note, for in the following year, when an epidemic was raging at *Lyon*, he was solemnly invited thither by the civic authorities, and is said to have rendered immense services. He first fell upon his prophetic vein about the year 1547, but in what light he himself regarded his pretensions, it is now impossible to say. At anyrate, he commenced to write his famous predictions ("Prophéties") which first appeared at *Lyon* in 1555. These predictions were in rhymed quatrains, divided into centuries, of which there were seven; the 2d ed., published in 1558, contained ten. Astrology was then the fashion, and these quatrains, expressed generally in obscure and enigmatical terms, had a great success. Some, indeed, regarded the author as a quack, but the great majority as a genuine seer or predictor of the future. He was, consequently, much sought after by all sorts of people, high and low. *Catharine de' Médis* invited him to visit her at *Blois*, to draw the horoscope of her sons, and on his departure loaded him with presents. The Duke and Duchess of Savoy went to *Salon* expressly to see him; and when *Charles IX.* became king, he appointed *N.* his physician-in-ordinary (1564). He died at *Salon*, 2d July 1566. *N.*'s predictions have been the subject of an immense amount of illustrative and controversial literature. He also wrote an *Almanac*, which served as the model of all subsequent ones, containing predictions about the weather.—See *Jaubert's "Vie de M. Nostradamus," "Apologie et Histoire" (Amst. 1656); Astruc's "Mémoires pour servir à l'Histoire de la Faculté de Montpellier" (Paris, 1767); "Apologie pour les Grands Hommes Soupçonnés de Magie" (Paris, 1825); and E. Barestie's "Nostradamus" (Paris, 1842).*

**NO'STRILS**, Diseases of the. Acute inflammation of the nasal mucous membrane is a very common and well-known affection, which has been already described under the title of *CATARRH* (q. v.), or *Cold in the Head*; while the chronic form of inflammation is described in the article *OZÆNA*. Hemorrhage from the nostrils, or *Epistaxis* (Gr. a dropping), is by far the commonest form of bleeding from a mucous membrane. It may be produced (1) by direct injury, as by a blow on the nose, or a scratch in the interior of the nostrils; or (2) it may be an *active* hemorrhage, in which case it is often preceded by a feeling of tension and heat in the nostrils, pain in the forehead, giddiness, buzzing in the ears, and flushing of the face (these symptoms are, however, seldom all present in the same case, and not unfrequently the



flow of blood is preceded by no apparent disorder); or (3) it may be of a *passive* character, and may be due either to a morbid condition of the blood, as in malignant scarlatina, typhoid and typhus fevers, scurvy, purpura, &c., or to obstruction of the circulation by disease of the liver and heart.

If the hemorrhage occur in a flushed plethoric subject, and is obviously of an active character, it may be regarded as a salutary effort of nature, and may be left alone till it ceases spontaneously; but if it continues so long as materially to weaken the patient, or if it be of the passive character, or if it arise from injury, then means should be taken to stop it with as little delay as possible. The patient should be placed in the sitting posture at an open window, with the head erect or slightly inclined backwards; and amongst the simpler means to be first tried, are compression of the nostrils by the fingers, the application of a key or other piece of cold metal to the back of the neck, and the occasional immersion of the face or whole head in cold water, especially if accompanied by a drawing-up of the water into the nostrils; or Dr Negrier's plan of causing the patient, in a standing position, suddenly to raise his arms straight upwards, and to retain them for a short time in this position—a remedy which he states to have always succeeded, even in very bad cases, when other means had failed. Should these means fail, recourse must be had to astringent injections (for example, twenty grains of alum dissolved in an ounce of water) thrown up the nostrils by a syringe, or to astringent powders (as finely-powdered galls, kino, matico, alum, &c.) blown up the nostrils by means of a quill or other tube, or snuffed up by the patient. As a final resource, direct compression must be applied. Abernethy never failed in stopping the bleeding by winding a piece of moistened lint around a probe, so as to form a cylindrical plug, passing this along the floor of the nose for its entire length, then carefully withdrawing the probe, and allowing the lint to remain for three or four days. Cases occasionally occur in which it is necessary also to plug the posterior orifices of the nostrils by an operation, into the details of which it is not necessary to enter.

*Polypus*, which is an old term employed to signify any sort of pedunculated tumor firmly adhering (literally, "by many feet") to a mucous surface, is of common occurrence in the nostrils; its most usual seat of attachment being one of the turbinated bones. The ordinary kind is of the consistence of jelly, yellowish, streaked with blood-vessels, and of a pear-shaped form. The patient has a constant feeling of fullness in the nostril (as if he had a cold in the head); he cannot effectually blow his nose; and his voice is sometimes rendered more or less thick and indistinct. If he force his breath strongly through the affected nostril, and at the same time compress the other, and close the mouth, the polypus may generally be brought in view. The best treatment is to seize the neck or pedicle with the forceps, and twist it off. The consequent hemorrhage may be readily checked by the means already described.

*Foreign bodies* are often inserted into the nostrils by children, and become impacted. They may usually be extracted by a small scoop or a bent probe. If they cannot be removed by these means, they must be pushed back into the throat through the posterior nares.

Children are occasionally born with imperforated nostrils. This congenital malformation may, however, usually be remedied by surgical assistance.

**NOT GUILTY** is the form of verdict in a criminal prosecution, and also in some civil actions, when the jury find in favor of the defendant or accused party. The verdict is conclusive, and the accused cannot, in criminal cases, be tried a second time.

**NOT PROVEN** is a form of verdict used in Scotland in criminal prosecutions when the jury think there is some foundation for the charge, but the evidence is not strong enough against the prisoner to warrant a verdict of guilty. In such a case, a verdict of "Not Proven" is substantially a verdict of acquittal. The prisoner cannot be tried afterwards, even though new and conclusive evidence come to light after the verdict.


**NOTABLES**, the name formerly given in France to persons of distinction and political importance. As the States General were inconvenient to the despotism of the monarchy, the kings of the House of Valois adopted the expedient of calling in their stead *Assemblies of the Notables*, the time of calling them and the composition

of them being entirely dependent on the pleasure of the crown, by which also their whole proceedings were guided, so that they generally consented at once to whatever was proposed to them. They shewed a particular readiness in granting subsidies, to which they themselves, as belonging to the privileged classes, were not to contribute. An Assembly of Notables, convened in Paris by Richelieu in 1626, and presided over by Gaston, brother of Louis XIII., consisted of only 35 members. For more than a century and a half even this poor acknowledgment of any other mind or will in the nation than that of the sovereign ceased to be made; but when the state of the finances brought the monarchy into difficulties and perils, Louis XVI., at the instigation of the minister Calonne, had recourse again to an Assembly of Notables, which met 22d February 1787, and was dissolved 25th May. It consisted of 137 members, among whom were 7 princes of the blood, 9 dukes and peers, 8 marshals, 11 archbishops, 22 nobles, 8 councillors of state, 4 masters of requests, 37 judges, 12 deputies of the Pays d'Etats, the civil lieutenant, and 25 persons belonging to the magistracy of different cities of the kingdom. Calonne's representations of the state of the finances induced the Notables to adopt many reforms in the matter of taxation; but no sooner was the assembly dissolved, than many of them joined the parliaments in opposition to resolutions adverse to their private interests, so that the king was compelled to determine upon assembling the State General. Necker, who had meanwhile been placed at the head of affairs, assembled the Notables again, 6th November 1788, to consult them concerning the form in which the States General should be convened, and particularly concerning the number of members of the third estate and the manner of voting. The Notables declared against every innovation, and so compelled the court to half measures, which helped to prepare the way for the Revolution.

**NOTARY-PUBLIC** is an officer of the law, whose chief function is to act as a witness of any solemn or formal act, and to give a certificate of the same; which certificate, if duly authenticated, is accepted all the world over as good evidence of the act done in his presence, and attested by him. The services of a N. are chiefly available where his evidence is to be used in a foreign country. Solicitors are sometimes notaries-public, but in England there are fewer notaries, comparatively, than in Scotland, where notarial acts and certificates are more largely used.

**NOTATION**, the method of representing numbers and quantities by marks or signs. The representation of numbers is known as "arithmetical," and that of quantities as "symbolical" notation.

**ARITHMETICAL NOTATION.**—The invention of arithmetical notation must have been coeval with the earliest use of writing, whether hieroglyphic or otherwise, and must have come into use about the time when it was felt that a mound, pile of stones, or huge misshapen pillar, was insufficient as a record of great events, and required to be supplemented by some means which would suffice to hand down to posterity the requisite information. The most natural method undoubtedly was to signify "unity" by one stroke, "two" by two strokes, "three" by three strokes, &c.; and, as far as we know, this was the method adopted by most of those nations who invented systems of notation for themselves. It is shewn on the earliest Latin and Greek records, and is the basis of the Roman, Chinese, and other systems. We have thus a convenient division of the different notational systems into the *natural* and *artificial* groups, the latter including the systems of those nations who adopted distinct and separate symbols for at least each of the nine digits. The Roman and Chinese systems are the most important of the former, and the Hebrew, later Greek, and "decimal" systems of the latter group.

**Roman System.**—The system adopted by the Romans was most probably borrowed at first from the Greeks, and was distinguished equally by its simplicity and its cumbronsness. The following seems to be the most probable theory of its development. A simple series of strokes was the basis of the system; but the labor of writing and reading large numbers in this way would soon suggest methods of abbreviation. The first and most natural step was the division of the strokes into parcels of tens, thus, , a plan which produced great facility in the reading of numbers. The next step was to discard these parcels of ten strokes each,

retaining only the two cross strokes, thus,  $\times$ , as the symbol for 10. Continuing the same method as larger numbers came to be used, they invented a second new symbol for 100, thus,  $\sqcap$  (which was at first probably the cancelling stroke for ten  $\times$ 's in the same way as  $\times$  was originally the cancelling stroke for ten units); and for the sake of facility in writing, subsequently employed the letter C, which resembled it, in its place. The circumstance that C was the initial letter of the word *centum*, a "a hundred," was doubtless an additional reason for its substitution in place of the original symbol for 100. An extension of the same process produced M, the symbol for 1000, which was also written  $\Lambda$ ,  $\mathcal{M}$ , and very frequently  $\text{CI}\mathcal{O}$ . This symbol was probably suggested by the circumstance that M was the initial letter of the Latin word *mille*, signifying a thousand. The early Roman system went no higher. But though the invention of these three symbols had greatly facilitated the labor of writing down and reading off numbers, further improvements were urgently required. The plan of "bisection of symbols" was now adopted;  $\times$  was divided into two parts, and either half,  $\sqrt{\phantom{x}}$  or  $\wedge$ , used as the symbol for 5;  $\sqcap$  was similarly divided,  $\sqcap$  or  $\sqcap$  standing for 50; and  $\Lambda$ ,  $\text{CI}$ , or  $\text{I}\mathcal{O}$ , was obtained in the same manner, and made the representative of 500. The resemblance of these three new symbols to the letters V, L, and D, caused the substitution of the latter as the numerical symbols for 5, 50, and 500. A final improvement was the substitution of IV for 4 (in place of IIII), IX for 9 (in place of VIIII), XC for 90 (instead of LXXXX), and similarly XL for 40, CD for 400, CM for 900, &c.; the smaller number, when in front, being always understood as subtractive from the larger one after it. This last improvement is the sole departure from the purely additive mode of expressing numbers; and if the symbols for 4, 9, 90, &c., be considered as single symbols, which they practically are, the deviation may be looked upon as merely one of form. In later times, the Roman notation was extended by a multiplication of the symbol for 1000, thus  $\text{CCI}\mathcal{O}\mathcal{O}$  represented 10,000;  $\text{CCCCI}\mathcal{O}\mathcal{O}$  represented 100,000, &c.; and the bisection of these symbols gave them  $\text{I}\mathcal{O}\mathcal{O}$  and  $\text{I}\mathcal{O}\mathcal{O}\mathcal{O}$  as representative of 5000 and 50,000 respectively. This, in all probability, is the mode according to which the Roman system of notation was constructed. To found a system of arithmetic upon this notation would have been well-nigh impossible; and so little inventive were the Romans, that the attempt seems never to have been made. They performed what few calculations they required by the aid of the *Abacus* (q. v.).

*Chinese System.*—This system presents a strong resemblance to the former, but is, in facility of expression, much superior to it. Like the Roman, it retains the primitive symbols for the first three digits, and like it also expresses the last four by prefixing a new symbol to the symbols for the first four, and the analogy is continued up to "twenty." From this point onwards, the Chinese system departs from the "additive" principle, as 20, 30, &c., are represented not as in the Roman system by a repetition of the symbol for 10, but by affixing to the symbol for 10, on its left side, the symbols for 2, 3, &c., as multiples. The same method is adopted with the numbers 200, 300, &c.; and should the number contain units, they are annexed on the right-hand side. For small numbers up to 20, the Roman notation is more expeditious, on account of the greater simplicity of its characters; but for very large numbers, the Chinese is scarcely more cumbersome than our own. Some numbers which are expressed by the Chinese with 14 characters, require more than 100 symbols when expressed in the Roman notation.

Previous to the intercourse of the Western European nations with China, their notation was much more cumbersome than it is at present; but the changes since made have affected merely the form of the characters, without altering the principle of the system.

*Artificial Systems.*—The first of these, in point of date, is the Hebrew; but as the knowledge we possess of it is very meagre, and as its principle was adopted by the

Greeks in the construction of their improved system, it will be sufficient to describe the latter.

*Greek System.*—The Greeks at first used a method similar to the Romans, though at the same time they appear to have employed the letters of the alphabet to denote the first 24 numbers. Such a cumbersome system was naturally distasteful to so fastidious a race, and they hit upon the happy expedient of dividing their alphabet into three portions—using the first to symbolise the 9 digits, the second the 9 tens, and the third the 9 hundreds. But as they possessed only 24 letters, they had to use three additional symbols; their list of symbols of notation then stood as follows:

Units.		Tens.		Hundreds.	
$\alpha$ represents.....	1	$\iota$ represents .....	10	$\epsilon$ represents .....	100
$\beta$ .....	2	$\kappa$ .....	20	$\sigma$ .....	200
$\gamma$ .....	3	$\lambda$ .....	30	$\tau$ .....	300
$\delta$ .....	4	$\mu$ .....	40	$\upsilon$ .....	400
$\epsilon$ .....	5	$\nu$ .....	50	$\phi$ .....	500
$\zeta$ (Introduced) .....	6	$\xi$ .....	60	$\chi$ .....	600
$\eta$ .....	7	$\theta$ .....	70	$\psi$ .....	700
$\theta$ .....	8	$\pi$ .....	80	$\omega$ .....	800
$\theta$ or $\vartheta$ .....	9	$\varsigma$ or $\zeta$ (Introduced)	90	$\vartheta$ , $\Lambda$ , $\overline{\Lambda}$ (Introduced)	900

By these symbols, only numbers under 1000 could be expressed, but by putting a mark, called *tota*, under any symbol, its value was increased a thousand-fold, thus  $\epsilon = 1000$ ,  $\nu = 20,000$ ; or by subscribing the letter M, the value of a symbol was

raised ten-thousandfold, thus,  $\nu = 20,000$ . For these two marks, single and double

dots placed over the symbols were afterwards substituted. This improvement enabled them to express with facility all numbers as high as 9,990,000, a range amply sufficient for all ordinary purposes. Further improvements were made upon this system by Apollonius, who also by making 10,000 the root of the system, and thus dividing the symbols into tetrads, greatly simplified the expression of very large numbers. Both Apollonius and Archimedes had to a certain extent discovered and employed the principle of giving to symbols values depending on their position and multiplicative of their real value, but this principle was applied to tetrads or periods of four figures only, and the multitude of symbols seems to have stood in the way of further improvement. Had Apollonius, who was the chief improver of the system, discarded all but the first nine symbols, and applied the same principle to the single symbols which he applied to the "tetrad" groups, he would have anticipated the decimal notation.

The Greek arithmetic, founded upon such a system of notation, was necessarily lengthy and complicated in its operations, each number in the multiplicand forming with each number in the multiplier a separate product (not as in our system, where one product blends with another by the process of "carrying"), though by arranging these products in separate columns, according as they amounted to units, tens, hundreds, &c., the process was somewhat simplified. But when fractions formed part of the multiplier and multiplicand, the Greek arithmetic became almost unmanageable, till the invention of SEXAGESIMALS (q. v.) by Ptolemy superseded it. After Ptolemy's death, all improvement was arrested.

*Decimal System.*—The decimal system, which was introduced into Europe from the East (see NUMERALS), was first employed by the Spaniards, and was from them transmitted to the French and Germans, through whom its use was extended over Europe. The modern arithmetic was not practised in England till about the middle of the 16th c., and for a long time after its introduction was taught only in the

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universities. The decimal system, possessing only 9 symbols—viz., 1, 2, 3, 4, 5, 6, 7, 8, 9 (called the nine digits)—adopts the principle of giving to each symbol or "figure" two values, one the absolute value, and the other a value depending upon its position. The numbers from "one" to "nine" inclusive are expressed by the nine digits; ten is expressed by writing a cipher or zero after 1 (10), thus throwing it into the second place, and giving it a positional value ten times its absolute value. From the principle that a figure thus moved one place to the left is held to be increased in value ten times, this method of notation is called *decimal notation* (Lat. *decem*, ten) and *ten* is said to be the "*radix*" of the system. The numbers from "eleven" to "nineteen" inclusive are expressed by taking the symbol 10 and putting the digits from "one" to "nine" inclusive in place of the zero—e. g., twelve is written 12, 1 in position signifying ten units, and 2, two additional units. On the same principle, twenty is expressed by putting 2 in the second position (20), and so on to 99. To express a hundred, 1 is put in the third place (100), thus making its value ten times what it is in the second place, or ten times ten units; two hundred is similarly expressed by 200, &c.; and should a number of tens and units amounting to less than a hundred exist in the number, the symbols expressing them are substituted for the two zeros. This process can be similarly continued without limit.

There is another way of looking at this notation, which is perhaps simpler and clearer. In such a number, e. g., as 333, instead of attributing different values to the figure 3 in the different positions, we may consider it as symbolising the same number throughout, namely, *three*; but *three what*? In the first place, it signifies three ones or units (e. g., three single pounds or sovereigns); in the second place, it still signifies three, but now it is three "tens" or decades (three parcels of ten sovereigns each); and in the third place, it still signifies three, but now three hundreds (three parcels of a hundred each). It is from this point of view that the first place to the right is called the *place of units*, or the *units' place*; the second, the *place of tens*, and so on. When such a number as 6473 is analysed on this principle, it is seen to mean  $6 \times 1000$  (6 times 1000) +  $4 \times 100$  +  $7 \times 10$  +  $3 \times 1$ ; and 6004 becomes  $6 \times 1000$  +  $4 \times 1$ . In this latter instance the peculiar importance of the figure 0 is seen (see NOTHING). Following out the method, the general formula for all numbers is  $a \times 10^n + b \times 10^{n-1} + c \times 10^{n-2} + \dots + m \times 10^3 + n \times 10^2 + p \times 10 + q$ , where  $a, b, c, \dots, m, n, p, q$ , stand for any of the nine digits or zero.

The special advantages of such a system are manifold. It enables us to express small numbers with the greatest ease, and as the smaller numbers are those most commonly used, this is a great point in favor of the system. It also gives to computation a unity which could never under any circumstances have existed in the systems of notation above described, and the most ordinary, and at the same time effective, illustration of this is the process of "carrying" in multiplication, whereby one product is blended with another, and much time and trouble in the subsequent addition is saved. This simplification, however, is chiefly due to the introduction of the symbol 0, which, supplying the place of an absent digit, preserves to those figures on the left of it their true positional value. Another advantage of this system is the ease with which computations involving fractions are performed (see FRACTIONS, DECIMAL). The use of the number 10 as *radix*, is universal in all systems of notation; but it has been often doubted, and in some respects with good reason, whether it is the number best fitted for this position, and many have proposed to substitute 12 for it. This question will be referred to under SCALES OF NOTATION.

2. SYMBOLICAL NOTATION, the general designation of those symbols which are used by mathematicians to express indefinite quantities. The symbols are generally taken from the English, Roman, and Greek alphabets, and are apportioned as follows: algebraic quantities are expressed by the English alphabet; those which are known, by the earlier letters  $a, b, c, \dots$ , and those which are unknown, by the later ones,  $u, v, w, x, y, \dots$ . In Trigonometry, the letters  $a, b, c, \dots$  denote measures of length, and  $A, B, C, \dots$  are used to express angles. In Mechanics and Astronomy, the Greek letters are generally used to express angles. When different sets of quantities are similarly related among themselves, the sets are, for convenience, expressed by the same letters; and to prevent confusion, each set has a peculiar mark attached to each symbol, thus,  $a, b, c, \dots$  denote one class;  $a', b', c', \dots$

$e$ ..... another class;  $a''$ ,  $b''$ ,  $c''$ ..... a third class; and so on; or  $a_1$ ,  $b_1$ ,  $c_1$ ,.....  
 $a_2$ ,  $b_2$ ,  $c_2$ ,..... &c.

**NOTE**, in Music, a character which by the degree it occupies on the staff represents a sound, and by its form the period of time or duration of that sound. The notes commonly in use in modern music are the semibreve, minim, crotchet, quaver, semiquaver, demisemiquaver, and semi-demisemiquaver. Taking the semibreve as unity, the minim is  $\frac{1}{2}$  its duration, the crotchet  $\frac{1}{4}$ , the quaver  $\frac{1}{8}$ , the semiquaver 1-16, the demisemiquaver 1-32, and the semi-demisemiquaver 1-64. Notes of greater length than the semibreve were formerly in use—viz., the breve, twice the duration of the semibreve; the long, four times; and the large, eight times the semibreve. Of these the breve is still sometimes met with in ecclesiastical music.—The term note is often used as synonymous with musical sound.

**NOTHING**, in Mathematical language, denotes the total absence of quantity or number, as when equals are subtracted from equals, but it is often employed (see LIMITS) to indicate the limit to which a constantly decreasing positive quantity approaches. The absence of number or quantity could be equally well signified by the absence of any symbol whatever, but the presence of "0" shows that in its place some number or quantity might, and under other circumstances would, exist.

In Physics, the symbol "0" is generally denominated *zero*, and has a different meaning. Like the former, it is the starting-point from which magnitude is reckoned; but while the starting-point in the former case was absolute, in this case it is conventional, and by no means denotes the absence of all quantity or magnitude. Thus the zero-point of the thermometer must not be interpreted to signify that when the mercury has fallen to this point atmospheric heat has totally vanished, but must be understood as a mere conventional starting-point for graduation, chosen for convenience, and not even necessarily representing any fixed natural degree of temperature.

**NOTICE TO QUIT**, is the formal notice given by a landlord to a tenant, or by a tenant to a landlord, that the tenant ought or intends to quit at a future day named. See LANDLORD AND TENANT.

**NO'TO**, a town of Sicily, in the province of Syracuse, and 16 miles south-west of the city of that name, 8 miles from the sea. It is of the highest antiquity, was a place of great strength under the Saracens, and held out against the invading Normans longer than any other town of Sicily. It is a very handsome town, contains rich churches, beautiful palaces, and broad and straight streets. Its academy has a library attached, and a collection of antiquities. A good trade is carried on in corn, wine, oil, and the other produce of the vicinity. Pop. 14,619. N. was destroyed by an earthquake in 1693, and rebuilt about  $4\frac{1}{2}$  miles from its former site.

**NOTORNIS**, a genus of birds of the family *Rallidae*, nearly allied to the coots, although in some of its characters it resembles the Ostrich family. One living species only is known, *N. Mantellii*, a native of New Zealand. It is particularly interesting, because the genus was originally established and the species characterised by Owen, from remains found along with those of *Dinornis* and other large birds of the Ostrich family, called Moas by the New Zealanders. The bird was, however, ascertained in 1850 still to exist. It inhabits some of the most unfrequented parts of the Middle Island. It is larger than the other coots, but small in comparison with the true moas. The flesh is said to be delicious. It seems to be a bird likely soon to become extinct unless preserved by human care, and of which the domestication would be easy and desirable.

**NOTRE DAME**, i. e., *Our Lady*, the old French appellation of the Virgin Mary, and therefore the name of a number of churches dedicated to the Virgin Mary in different parts of France, and particularly of the great cathedral of Paris.

**NO'TTINGHAM**, a municipal and parliamentary borough of England, capital of the county of the same name, and a county in itself, on the Leen at its junction with the Trent, 180 miles north-north-west of London. It is built principally on the slope and at the foot of a rocky eminence, and in an architectural sense it has within recent years been much improved. The market-place is  $5\frac{1}{2}$  acres in extent, and is surrounded by lofty buildings. The Trent, which passes about a mile south of the town, and is here about 200 feet wide, is crossed by railway bridges, and by an

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ancient bridge of 19 arches. The exchange, the town and county halls, the House of Correction, St Mary's Church, the Roman Catholic Chapel, and the new Free Grammar-school erected in 1868, are edifices worthy of special mention. The Free Grammar-school, with an income from endowment of about £1000 a year, was founded in 1513. A free library was opened in April 1868. There are numerous hospitals for the poor and infirm. Of the manufactures, which are various and important, the principal are hobbinnet and lace, and cotton and silk hosiery. Cotton, silk, and flax mills, bleaching-works, and wire, iron, and brass works are in operation. N., which sends two members to parliament, is on the Derby and Lincoln Railway. Pop. (1871) 86,621.

The original castle of N. was built by William the Conqueror; it was dismantled during the Protectorate, and replaced by the present edifice—a castle only in name.

**NOTTINGHAM**, an inland county of England, between Lincolnshire on the east, and Yorkshire and Derbyshire on the west. Area, 526,176 acres; pop. (1871) 319,768. It is 50 m. in length from north to south, and 20 miles in average breadth. The meridian of 1° w. falls along the middle of the county, and may be said to divide it into two nearly equal portions, of which the eastern, comprising the vale of the Trent, is level, and the western is occupied by hills at no great elevation. In the south of the county are wolds, consisting of upland moors and pasture-lands, broken up by many fertile hollows. In the west are the remains of the royal forest of Sherwood, famous as the chief haunt of Robin Hood. The principal rivers are the Trent, and its tributaries the Erewash, Mann, and Idle. The Nottingham and Grantham Canal in the south connects the Trent with the Witham, and these two rivers are also connected by the Fosse Dyke Canal, which, running north-west from the city of Lincoln, joins the Trent on the north-eastern boundary of the county. By the rivers, canals, and the North Midland, Sheffield and Lincoln, and Great Northern Railways, there is direct communication in every direction. The climate, especially in the east, is remarkably dry. The soil is various; and, with regard to productiveness, the land is not above mediocrity. The usual crops are raised; there are many hop-plantations, and much land is laid out in market-gardens. Extensive tracts have been planted recently. Four members of parliament are returned for the county.

**NOU'KHA**, a town of Asiatic Russia, in Trans-Caucasia, is built on the southern slope of the Caucasus Mountains, 80 miles south-west of Derbend, in lat. 41° 12' N., long. 47° 13' E. Pop. (1867) 23,371, consisting of native Tartars belonging to the Mohammedan creed, of Armenians, and a few Russians, chiefly officials. Breeding the silk-worm is the staple branch of industry. The native breed of silk-worms is somewhat coarse, and is now being supplanted by the Italian breed.

**NOUN** Lat. *nomen*, a name), in Grammar, is the term applied to that class of words that "name" or designate the persons and things spoken about. In a wide sense, such words as *rich*, *tall*, are nouns, as well as *John*, *man*, *tree*; for they are names applicable to all objects possessing these attributes. But as words like *John*, *man*, *tree*, suffice of themselves to mark out or designate an object or a definite class of objects, while words expressive of a single attribute, like *rich*, *tall*, can be used only in conjunction with such a word as *man* or *tree*, the one class are called Adjective Nouns, or simply Adjectives (q. v.), while the other are called Substantive Nouns, or simply Substantives or Nouns. Nouns or Names, in this narrower sense, may be divided into classes in a variety of ways, according to the ground we take for our division. One of the distinctions commonly made by grammarians is into Proper Nouns and Common Nouns. A proper noun is usually defined to be "the name of any individual person, or place," as *John*, *London*; while a common noun is applicable to every individual of a class of objects, as *prince*, *city*. But this definition fails to point out the real difference; for there are several *Londons*, and there are more *Johns* than *princes*; other things also have proper names, besides persons and places, as ships (the *Minotaur*), and bells (the *Big Ben*). Providence, again, although applicable to only One Being in the universe, is not a proper noun. Wherein, then, lies the difference? In order to answer this question, we must advert to an important distinction made by logicians with regard to the import of names. A word is said to denote all the objects to which it is applicable as a name; thus the word *man* is a name for all the objects known individually as James, John, Adam, Caesar, &c., and therefore denotes the

whole human race; but while thus denoting or naming them, it also implies something concerning them; in the language of logic, it *connotes* that they possess certain attributes, namely (1) a certain corporeal form, known as the human form; (2) animal life; (3) rationality. All this, at least, is included in the *meaning* or *connotation* of the word "man." Now, if we consider any noun of the class called common, we find that while it denotes, or names, or points out a certain object, or class of objects, it also conveys or implies some qualities or facts concerning them; in other words, all such names are *connotative*, or have a meaning. Not so with proper nouns. To say that a man is called John Butler, informs us of no quality he possesses, or of any fact except that such is his name. The name itself conveys no meaning; it is *non-connotative*. And this is what really constitutes a proper name; it is affixed to an object, not to convey any fact concerning it, but merely to enable you to speak about it. Proper names, indeed, are often given at first on account of the object possessing certain attributes; but once given, they do not continue to connote those attributes. The first John Baker was probably so called because he exercised the trade of baking; but his ceasing to bake would not have made him lose the name; and his descendants were called Baker, regardless of their occupation.

Proper names are thus *meaningless marks*, to distinguish one individual from another; and the A, B, C, &c., which a geometrician affixes to the several angles of a figure, are as much proper names as Tom, Lawrie, &c., applied to the individual bells of a chime. The proper contrast, then, to a Proper Noun is not a Common Noun—meaning by that a name common to a class of objects—but a Significant Noun.

Of Significant Nouns, by far the greater number are General or Class Names; that is, they can be applied to any individual of a class of objects, implying that all these individuals have certain attributes in common—as *quadruped*, *book*. The quadruped spoken of may perhaps be a *horse*, and here we have another class-name, applicable to the same object, but of less generality than "quadruped." *Animal*, again, is more general than quadruped, being applicable to a far wider class. But it is important to observe, that as the number of objects that the terms are applied to or denote, increases, the number of attributes they imply—in other words, the amount of their meaning—diminishes. To call an object an "animal," merely implies that it is organized and is alive (with that kind of life called animal life); to call it a "quadruped," implies all this and a number of attributes in addition; and to call it a "horse," implies a still further addition.

It is to this class of words that the term Common Nouns is properly applicable; and the contrast to them is not Proper Nouns, but what might be called Singular Nouns, such as "God," "providence," "universe."

*Collective Names* are such as *regiment*, *fleet*, *senate*, *school*. They form a subdivision of Class Names or Common Nouns; for *regiment* is applicable to all collections of men organised in a particular way.

*Names of Materials*, are such as *iron*, *water*, *sugar*, *wheat*. These two classes appear in many cases to merge into each other. In both, the objects named consist of an aggregation; but in collective names, the parts forming the collection are thought of as individual objects; as the *soldiers* of a regiment, the *fishes* composing a school. Substances, again, like iron, gold, water, are not made up of *definite* individual parts (at least to our senses); and in such as wheat, sand, the name of the individual visible part (*grain* of wheat, *grain* of sand) is derived from the name of the mass, shewing that the idea of the individual is swallowed up in that of the mass.

A convenient term for names of materials or substances is that used by German grammarians—*Stoff-nouns*. Sometimes the same word is used as a *stuff-noun*, and also as a *class-noun*. Thus: "The cow eats *grass*" (*stuff-noun*); "The botanist studies the *grasses*, and has found a new *grass*" (*class-noun*); "They had *fish* (*stuff-noun*) for dinner, and consumed four large *fishes*" (*class-noun*).

Names of materials are not, like collective nouns, a subdivision of common nouns; they belong to the contrasted class of singular nouns; and, when the substance is simple or invariable in composition, cannot be used in the plural; as *gold*, *water*, *beef*.

*Abstract Nouns*.—In the expression "hard steel," or "the steel is hard," the word *hard* implies a certain quality or attribute as belonging to the steel. This quality has no existence apart from steel or some other substance; but I can withdraw (*abstract*) my thoughts from the steel in other respects, and think of this quality as if it had an independent existence. The name of this imaginary exist-



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ence or abstraction is *hardness*. All words expressive of the qualities, actions or states of objects, have abstract nouns corresponding to them; as *brave—bravery*; *strike—stroke*; *well—health*. In opposition to abstract nouns, all others are *concrete* nouns—that is, the attributes implied in them are considered as embodied in (*concrete*, Lat. growing together) the actual existences named.

**NOUREDDIN-MAHMÛD**, Malek-al-Adel, one of the most illustrious men of his time, and the scourge of the Christians who had settled in Syria and Palestine, was born at Damascus, 21st February 1116. His father, Omad-ed-din Zengul, originally governor of Mosul and Diarbekir on behalf of the Seljuk sultans, had established his independence, and extended his authority over Northern Syria, including Hems, Edessa, Hamah, and Aleppo. N. succeeded him in 1143, and the better to carry out his ambitious designs, changed the seat of government from Mosul to Aleppo. Count Joscelin of Edessa, thinking the accession of a young and inexperienced sovereign afforded him a favorable opportunity of regaining his territories, made an inroad at the head of a large force, but was singularly discomfited under the walls of Edessa, his army, with the exception of 10,000 men, being completely annihilated. The report of N.'s success being conveyed to Western Europe, gave rise to the second Crusade. The Crusaders were, however, felled by N. before Damascus, and being defeated in a number of partial conflicts, abandoned their enterprise in despair. N. next conquered Tripolis and Antioch, the prince of the latter territory being defeated and slain in a bloody conflict near Rugla (29th June 1149), and before 1151 all the Christian strongholds in Syria were in his possession. He next cast his eyes on Egypt, which was in a state of almost complete anarchy under the feeble sway of the now effeminate Fatimites and, as a preliminary step, he took possession of Damascus (which till this time had been ruled by an independent Seljuk prince) in 1156; but a terrible earthquake which at this time devastated Syria, levelling large portions of Antioch, Tripolis, Hamah, Hems, and other towns, put a stop to his scheme for the present, and compelled him to devote all his energies to the removal of the traces of this destructive visitation. An illness which prostrated him in 1159, enabled the Christians to recover some of their lost territories, and N., in attempting their re-subjugation, was totally defeated near the Lake of Gennesareth by Baldwin III., king of Jerusalem; but undismayed by this reverse, he resumed the offensive, defeated the Christian princes of Tripolis and Antioch, making prisoners of both, and again invaded Palestine. Meanwhile, he had obtained the sanction of the calif of Bagdad to his projects concerning Egypt, and the true believers flocking to his standard from all quarters, a large army was soon raised, which, under his lieutenant Shirkooh, speedily overran Egypt. Shirkooh dying soon after, was succeeded by his nephew, the celebrated Salah-ed-din (q. v.), who completed the conquest of the country. N., becoming jealous of his able young lieutenant, was preparing to march into Egypt in person, when he died at Damascus, 16th May 1174. N. is one of the great heroes of Moslem history. Brought up among warriors who were sworn to shed their blood for the cause of the Prophet, he retained in his exalted station all the austere simplicity of the first califs. He was not, like the majority of his co-religionists, a mere conqueror, but zealously promoted the cultivation of the sciences, arts, and literature, and established a strict administration of justice throughout his extensive dominions. He was revered by his subjects, both Moslem and Christian, for his moderation and clemency, and even his most bitter enemies among the Christian princes extolled his chivalrous heroism and good faith. He possessed in an eminent degree the faculty of impressing his own fiery zeal for the supremacy of Islam upon his subjects, and their descendants at the present day have faithfully preserved both his name and principles.

**NOVA SCO'TIA**, a province of the Dominion of Canada, is bounded on the n. w. by New Brunswick and the Bay of Fundy, on the n. by the Straits of Northumberland and the Gulf of St Lawrence, and on the other sides by the Atlantic Ocean. It consists of two portions, N. S. proper, a large peninsula connected with New Brunswick by an isthmus about 15 miles in width, and the island of Cape Breton (q. v.). The peninsula, about 230 miles in length, and from 50 to 100 miles broad, extends in an east-north-east and west-south-west direction. Cape Breton lies north-east of N. S. proper, separated from it by a narrow strait called the Gut of Canso, 16

miles long, and from half a mile to 2 miles wide. Sable Island, which is 25 miles in length by  $\frac{1}{2}$  in breadth, and is surrounded by a dangerous, widely-extended sand-bank, is situated about 90 miles from the nearest coast of N. S., in lat.  $44^{\circ}$  n., and long.  $60^{\circ}$  w. It is formed of sand-hills thrown up by the sea, some of them being about 80 feet in height. The island is covered with wild grasses, which support herds of wild horses, known as Sable Island ponies. It is in the track of vessels trading between America and Britain, and owing to the number of wrecks that take place on its shores, a superintendent and several men are stationed here for the purpose of rescuing and aiding shipwrecked mariners. The area of the province is 18,600 square miles; pop. (1871) 387,500. The coast-line is about 1000 miles in length, and the shores, which are much indented, abound in excellent bays and harbors, of which the chief are Chedabucto Bay, Halifax Harbor, St Margaret's, Mahon, and St Mary's Bays, Annapolis, Mines and Chignecto Basins, and Pictou Harbor. There are numerous rivers, but few of them are over 50 miles in length; the most important are the Avon, the Annapolis, and the Shubenacadie. N. S. contains about 400 lakes, of which the Bras d'Or, in Cape Breton, covers an area of 500 square miles, or about one-sixth of the entire area of the island. Stretching along the Atlantic sea-board, and extending inland from it for about 20 miles, is a range of highlands, and about 60 miles from the Atlantic coast are the Cobequid Mountains, 1100 feet in height; which traverse the peninsula from the Bay of Fundy to the Straits of Canso. The soil in the valleys is rich and fertile, producing all the fruits of temperate climates; and, especially in the north, the uplands also are fertile. The climate is remarkably healthy, its rigor being modified by the insular character of the province, and by the influence of the Gulf Stream. The mean temperature for the year is  $42.69^{\circ}$  at Pictou, and  $43.6^{\circ}$  at Windsor. The extreme limits of the thermometer may be stated at  $-15^{\circ}$  Fahr. in winter, and  $95^{\circ}$  in the shade in summer. The province abounds in mineral riches, including gold, coal, and iron. Gold was first discovered in the colony in March 1861, on Tangier River, about 40 miles east of Halifax. The chief diggings are along the Atlantic coast, and gold has been found in nearly 100 different localities. An act of the legislature regulating the disposal of claims and the collection of revenue from the gold-fields was passed in March 1862. The gold mines have been worked steadily, and in many cases profitably. In 1871, the yield of gold was 19,227 oz., in value about 855,700 dollars; in 1875, the yield was 11,208 oz., valued at 201,756 dollars. In 1875, 781,165 tons of coal and 4467 tons of iron ore were raised in the province. Of the entire area of the colony, 10,000,000 acres are considered good land, and of these 1,023,032 acres were under cultivation. Three-fourths of the whole area are comprised in the peninsula of N. S., and the remainder in the island of Cape Breton. The principal agricultural products are hay, wheat, barley, buckwheat, oats, rye, Indian corn, potatoes, and turnips. The waters around the colony abound in fish, as mackerel, shad, herring, salmon, &c., and the fisheries are pursued with ardor and with ever-increasing success. In 1873-4, the number of men employed in the fisheries was 21,031, and the total value of the fish caught, 6,652,301 dollars. In 1873-4, the imports amounted to £3,181,470, the exports to £1,531,800; the revenue for 1873 to £134,500, the expenditure to £136,200. The number of vessels that arrived in N. S. during the year ending 30th June 1874, was 4424, of 959,114 tons, and the number that departed 3752, of 861,263 tons. There are in the colony 1150 miles of telegraph, and 800 miles of railway. It is provided with 5 colleges, 10 academics, and 1700 grammar, normal, and other schools.

N. S. is supposed to have been visited and "discovered" by the Cabots in 1497. Its first colonists were a number of Frenchmen, who established themselves here in 1604, but were afterwards expelled by settlers from Virginia, who claimed the country by right of discovery. Under the French settlers it bore the name of Acadia (Acadie); but its name was changed for its present one in 1621, when a grant of the peninsula was obtained from James I. by Sir William Alexander, whose intention was to colonise the whole country. Having found, however, that the localities they had fixed upon as suitable for settlement were already occupied, the colonists returned to the mother-country. In 1654, the French, who had regained a footing in the colony, were subdued by a force sent out by Cromwell. By the treaty of Breda, the country was ceded to the French in 1667, but it was restored to the English in 1713. After the middle of the 18th c., strenuous efforts were made to ad-

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vance the interests of the colony. Settlers were sent out at the expense of the British government. The French, who had joined the Indians in hostilities against the English, were either expelled or completely mastered, and Cape Breton, which at an earlier period had been disunited from N. S., was reunited to it under the same provincial government in 1819. N. S. was incorporated with the Dominion of Canada in 1867, and is represented in the Canadian parliament by 12 senators and 20 members of the Lower House. It has also its own local legislature and lieutenant-governor; the legislature consisting of a council and a House of Assembly elected by the counties—which are 18 in number—and the cities, the chief of which are Halifax, Annapolis, Liverpool, and Pictou.

NO'VA ZE'MBLA (Russ. *Novaja Zemlja*, "New Land"), the name given to a chain of islands lying in the Arctic Ocean (lat. between 70° 30' and 76° 30' n., and long. between 52° 66' e.), and included within the government of Archangel. Length of the chain, 470 miles; average breadth, 56 miles. The most southern island is specially called Nova Zembla; of the others, the principal are Matthew's Land and Lütke's Land. They were discovered in 1553, and are wild, rocky and desolate—the vegetation being chiefly moss, lichens, and a few shrubs. The highest point in the chain is 3475 feet above the level of the sea. Mean temperature in summer, at the southern extremity, 35° 51°: in winter, 3° 21°. N. Z. has no permanent inhabitants, but as the coasts swarm with whales and walrus, and the interior with bears, reindeers, and foxes, they are periodically frequented by fishermen and hunters.

NOVALIS. See HARDENBERG.

NOVA'RA, a town of Northern Italy, and capital of province of same name, is situated in a fertile district, about 60 miles east-north-east of Turin. Pop. (1871) 24,185. It commands fine Alpine views from its ancient dismantled fortifications, and contains several notable churches, especially the cathedral, with its fine frescoes and sculptures, and grand high-altar. On the 23d of March, 1849, N. was the scene of a great battle between the Sardinian forces and an Austrian army commanded by Radetzky, which resulted in the complete defeat of the Italians, and ultimately led to the abdication of Charles Albert in favor of his son, Victor Emmanuel.

NOVA'TIAN, a priest of the Roman Church in the 3d c., and the leader of a sect called after his name. The place and time of his birth are not known with certainty. N. had been a stoic philosopher, but after his arrival in Rome was converted to Christianity, and being seized with sudden illness was still a catechumen, received what was called *clinical* baptism; that is, baptism administered on a sick-bed, and without the solemn ceremonial. Such baptism was, in ordinary circumstances, an impediment to holy orders. Notwithstanding this irregular baptism, N. was promoted to orders by Fabian the Roman bishop; and soon afterwards shewed his weakness by flying during a persecution. At this time a controversy arose about the manner of dealing with the lapsed; that is, those who fell away in persecution. N. at first inclined to the milder side, but on the election of Cornelius to the Roman bishopric to which N. had aspired, and on Cornelius taking the indulgent course towards the lapsed, N., together with Novatus and some other discontented priests of Carthage, opposed his authority, and eventually N. was chosen by a small party, and actually ordained bishop, in opposition to Cornelius. The party who espoused his cause was called by his name. They were confined mainly, in the first instance, to Rome and to Carthage, where a kindred conflict had arisen. They held that in the grievous crime of idolatry through fear of persecution, the church had no power to absolve the penitent; and therefore, although it does not appear that they excluded such sinners from all hope of heaven, yet they denied the lawfulness of re-admitting them to the communion of the church. This doctrine they extended at a later period to all grievous sins, of whatever character. N. may thus be regarded as the first antipope. The churches throughout Italy, Africa, and the East adhered to Cornelius; but the N. party set up bishops and established churches not only at Carthage, but at Constantinople, Alexandria, Nicomedia, Phrygia, Gaul, Spain, and elsewhere. They claimed for themselves a character of especial purity, and assumed the appellation of Cathari (Puritans). The time and manner of the death of N. is uncertain. According to Socrates ("Hist. Ecc." iv. 23; v. 21; vii. 5, 12, 25), he died a martyr in the persecution of Valerian, but this is improbable. He was a man of considerable learning, and the work recently discovered in one of the monasteries of Mount Athos, and pub-

lished by Mr Miller at Oxford in 1851, under the title of "*Origenis Philosophumena*," is by some ascribed to him. His sect survived long after his death. An unsuccessful effort was made in the council of Nice to rennate them to the church; and traces of them are still discoverable in the end of the 6th century.

NOVELDA, a town of Spain, in the province of Alicante, and 18 miles west from Alicante, on the railway between Madrid and Alicante. There are corn and oil mills, brandy distilleries, and manufactures of lace. Pop. 8095.

NOVELLO, Clara, a distinguished vocalist, daughter of the following, was born in 1818. Her talent showed itself very early. At the age of ten, she became a pupil of the French Academy of Singing for Church-music, and studied in Paris for several years, following up her studies in after-years in Italy and Germany. Both in England and in Italy, she created quite a *furor* from the year 1840 to 1848: her singing has indeed hardly ever been equalled in equality, flexibility, and executive skill. In 1848, she married Count Gigliucci, and quitted the stage, returning to it, however, for a time from 1850 to 1866.

NOVELLO, Vincent, an eminent musical performer and composer, was born in London, of an Italian father and English mother, in 1781. At the age of 16, he was organist in the chapel of the Portuguese embassy; and even then had attained a large measure of that proficiency on the organ for which he was celebrated in later life. He was one of the founders of the Philharmonic Society. His musical compositions, which are very numerous, and chiefly sacred, are considered to have contributed much to the improvement of cathedral music. As a pains-taking editor of unpublished works of eminent musicians, he has also done great service to musical literature. He died at Nice in 1861.

NOVELLÆ. See JUSTINIAN.

NOVELS. The novel and the so-called romance, inasmuch as they constantly merge in one another, and are only superficially distinguished by the preponderance in the one of ordinary and familiar incidents, in the other of incident more or less remote and marvellous, may conveniently be included here under the common definition of prose narrative fiction. Between the legendary epic, the drama into which portions of its available material from fable become crystallised, and the wider prose fiction or novel, into which this again expands itself, there are obvious affinities, the distinctions being rather of form than of essence. It is of the later development, the novel, that we purpose to give here a historical sketch, omitting, however, any consideration of the remoter and but slightly known specimens produced in Hindustan and China.

1. *Ancient Classical Prose Fiction*.—The earliest Greek compositions of a fictitious character, of which we possess any knowledge, are the "*Milesiaca*," or "*Milesian Tales*," said to have been written chiefly by one Aristides. The Milesians were a colony of Ionic Greeks who settled in Asia Minor, and fell under the dominion of the Persians, 494 B. C. They were a voluptuous, brilliant, and inventive race, and are supposed to have caught from their eastern masters, whom they somewhat resembled, a liking for that particularly oriental species of literature—the imaginary story or narrative. None of the Milesian Tales are extant, either in the original Greek or in the Latin version made by Sisenna, the Roman historian, about the time of Marius and Sulla; but we have some forty stories by Parthenius Nicaean, which are considered to be to a certain extent adaptations from them. The collection of Parthenius is entitled "*Peri Erotikōn Pathēmātōn*," and is dedicated to Cornelius Gallus, the Latin poet, and the contemporary and friend of Virgil. If we may judge from this later set of fictitious, which are mainly concerned with the description of all sorts of seduction, of criminal and incestuous passions, and of deplorable terminations to wretched lives, we have little cause, either morally or æsthetically, to regret the loss of their more famous prototypes. In Greece Proper, nothing was done, so far as we know, in the way of novel or romance, until after the age of Alexander the Great. It has been conjectured, not improbably, that his Eastern conquests had a potent effect in giving this new bent to the fancy of his countrymen. Clearchus, a disciple of Aristotle, wrote a history of fictitious love-adventures, and is thus, perhaps, to be considered the first European Greek novelist, and the first of the long series of "*Erotikoi*," who reach down to the 13th c. after Christ. Not long after came Antoninus Diogenes, whose romance, in 24 books, entitled "*Ta hyper Thoulon Apista*" (Of the Incredible Things beyond Thule), was founded on the wanderings,

adventures, and loves of Dindas and Dercyllia. It appears to have been held in high esteem, and was at least useful as a store-house, whence later writers, such as Achilles Tatius, derived materials for their more artistic fictions. The work has not been preserved, but Photinus gives an outline of its contents in his "Bibliotheca Cod."

A long interval, embracing, indeed, several centuries, now elapses before we come upon another Greek novelist or romancist. Be the cause of this what it may, the ever-increasing luxury and depravity of the pagan imperial world, combined to develop and intensify that morbid craving for horrible, magical, and supernatural incidents, which in general fill the pages of the romancists of the empire. The first names that occur in the new series are Lucius of Patra (*Patrensis*) and Lucian (q. v.), who flourished in the 2d c. A.D., during the reign of Marcus Antoninus; but as the former simply collected accounts of magical transformations (*Metamorphoses*), he is perhaps not to be regarded as a novelist proper at all; while the latter was really a humorist, satirist, and moralist in the guise of a story-teller—in a word, a classic Rabelais and Heine, and as far as possible from being a member of the wonder-loving school of Erotics, with whom he has only an accidental connection by the external form of some of his writings. The first of the new series of romance writers, strictly so called, is properly Iamblichus (not the Neo-Platonic philosopher), whose "Babylonica" is, indeed, no longer extant; but we are able to form a pretty just estimate of it from the epitome of Photinus. The next notable name is that of Heliodorus (q. v.), Bishop of Trilicca, who flourished in the 4th c. A.D. This Christian writer, whose "Loves of Theagenes and Charicleia" is really the oldest extant *erotic* romance, has far excelled all his predecessors in everything that can render a story interesting or excellent, and his charming fiction obtained a great popularity among such as could read. Some imagine that they see in Heliodorus a resemblance to the minutely descriptive style of novel introduced into England by Richardson; but without adopting this rather extreme notion, it can at least be safely asserted, that Achilles Tatius and all the subsequent *erotikoi* deliberately imitated his style and manner, while he was not less certainly used as a model by that once celebrated but dreadfully tedious school of heroic romance which flourished in France during the 17th c., and whose best-remembered representative is Mademoiselle de Scudéri. Tasso, Guarini, D'Urfé, and several other modern writers, have drawn many particulars—sometimes almost *verbatim*—from the stories in the "Theagenes and Charicleia." Achilles Tatius (q. v.), probably belonging to the 5th c., ranks next to, but at some distance from, Heliodorus in point of merit. His romance, entitled "Ta kata Leukippon kai Kleitophonta," and consisting of eight books, has supplied incidents to more than one Italian and French writer.

The next work that invites our attention in point of time, the "Daphnis and Chloe" of Longus, is of a totally different character. It is a simple and picturesque prose-pastoral, with no poisonings, murders, magic, supernaturalism, and impossible exploits. Over the whole story rest a rural peace and a smile of cheerful sunshine; and, in spite of some singularly polluted passages, it was, for its time, a pure and wholesome fiction. "Daphnis and Chloe" is the only pastoral romance produced by any Byzantine author. Whether or not it exercised any influence on the development of the *modern* pastoral of Italy and France, cannot be proved, but it has been noticed that there is no slight resemblance between it and the story of the "Gentle Shepherd," which we know was suggested to Allan Ramsay by a classical friend, who may have borrowed from the Greek the sketch which he gave to the poet. It has also been very closely imitated by Gessner in his idyll of "Daphnis."

After Longus comes Chariton (flor. some time between the 6th and 9th centuries), whose romance, in eight books, on the "Loves of Chæreas and Callirrhoe," is not quite complete, but nearly so. It contains, like the other erotic fictions, plenty of stirring and startling adventures, but on the whole these are less improbable than what we encounter in the writings of his predecessors. Of three Xenophons, also noted among the "erotikoi," and of uncertain date, the best is Xenophon of Ephesus, whose romance, entitled "Ephesiaca, or the Loves of Anthia and Abrocomas," is in ten books, and has all the sensational characteristics of the school to which it belongs. It is, however, perhaps worth mentioning, that in the romance of Xenophon we meet for the first time with the story of the love-potion, the pretended death, and the mock-entombment of the heroine, which forms the leading incident

in Shakespeare's "Romeo and Juliet," and which, it is thought, reached the great English dramatist at second or third hand, through the Italian novelist, Luigi da Porta.

Again, a long interval elapses before we meet with another love-fiction of the old pagan sort. During this period, however, a work made its appearance, which was essentially a romance, and was composed expressly for the purpose of recommending that form of Christian life which was the favorite in early times—the ascetic and reclusive form. This was the "Barlaam and Josaphat" (q. v.), the author of which is unknown, but whose popularity, during the middle ages, may be estimated from the fact, that it was translated into every language of Christendom from Norway to Spain. In the 12th c., another erotic Eustathius or Eumathius, who was properly the last of the series, published his "Ismene and Ismenias," in eleven books. This romance is, in truth, a feeble performance; the expiring flicker of a lamp whose oil is about done. It is puerile in its delineation of character, and full of plagiarisms; yet many of its details have been copied by later occidental writers, such as D'Urfé and Montemayor.

In all the erotic romances, the adventures, which in fact constitute the story, have certain common characteristics. The hero and heroine are generally carried off by robbers or pirates; or they flee from home, and are accidentally separated. They resolve to seek each other throughout the world, and in the course of their loving quest, they visit the remotest regions, encounter the most frightful perils, make hair-breadth escapes from tragic ends, meet again in most unexpected and miraculous ways, and generally close their career in happiness and splendid prosperity—often turning out to be the offspring of far greater people than they fancied. Copious use is made of poisons, love-potions, improbable tricks, magic instruments, &c.; and one can easily see that the stories were meant to tickle and stimulate a languid, corrupt, sensual, and credulous people, such as the Greeks of the Lower Empire undoubtedly were.

Before touching on the medieval romance of Western Europe, we may in a few words notice such specimens of classical fiction as exist, or are known to have existed in Latin. We have already stated that the Milesian Tales were translated into that tongue by Siscenna, who derived his knowledge of them from the Sybarites, a Greek colony of Lower Italy. The taste for similar stories increased during the empire, but the writers in general cannot have displayed much genius in their compositions, if we may judge from the contemptuous language used by the Emperor Severus against Clodius Albinus, whose fictions he designates *ludicra literaria* and *anilia* (old wives' tales). But higher praise must be assigned to the work commonly attributed to Petropius Arbiter (q. v.), who flourished in the time of Nero, and whose "Satyricon"—incomplete—is a comic novel or romance, and (although the dirtiest work even in pagan literature) is executed with skill, vigor, and at times with beauty. In the 2d c. A.D., Appuleius (q. v.) wrote his "Aps" (called from its excellence the "Golden Ass"), which relates the adventures of a young man who had the misfortune to be accidentally metamorphosed into that animal, while sojourning in Thes-saly, retaining, however, his human consciousness. The miseries which he suffers at the hands of robbers, eunuchs, magistrates, and other persons into whose hands he falls, until the period when he is enabled to resume his former figure, are portrayed with a wit, humor, and fancy hardly inferior to Lucian. The work is also believed to have had, like the writings of his Greek contemporary, a moral and satirical aim. It was immensely popular in the middle ages, has supplied Boccaccio with some of his stories, and the author of "Gil Bias" with the picturesque incidents of the robbers' cave in the early part of his romance, and contains in the episode of *Cupid and Psyche* one of the loveliest allegories of classical antiquity.

2. *Romantic Fiction in Western Europe.*—The first thing to be clearly understood in connection with this branch of literature is, that it is *not* a continuation of the Græco-Byzantine or classical fiction, though, curiously enough, it began to spring up in the West just as the other was dying out in the East. It is a completely new growth, the product of new historical circumstances, which were but very slightly affected by Byzantine influences of any kind; and it transports us into a world of ideas, sentiments, beliefs, and actions, as different from what we find in the "Erotikoi" as could well be imagined. In the latter, the principal characters are mere lovers

forced into adventures by the ministers of fate; in the former, they are real heroes, of the old Homeric type, and seek dangers greedily and joyously. When we read the "Erotikoi," we are reminded in many ways that we are in the midst of a corrupt and decaying civilisation; when we turn to the romances of chivalry, in spite of certain superficial and barbarous vices, such as the prevalence of bastardy, and the indifference displayed to bloodshed, we feel that we are in the presence of a youthful, healthy, vigorous and growing social life. That these romances, generally from beginning to end, consist of a series of extraordinary and utterly impossible exploits, in which the magic, the mystery, and the enchantments of the "Arabian Nights" are rivalled or outshone, is unquestionable; but this proves no more than that the races of Western Europe, who slowly, during the dark ages, rose, by the help of the church, out of barbarism into feudalism—the first step towards the civilisation of the modern world—were boundlessly ignorant, credulous, and wonder-loving. Their prodigious vigor and vehemence of character having no proper intellectual *pabu*, was forced to supply its craving for a knowledge which was beyond its immediate attainment, by the exaggerations of a fancy that was without law or limit. We need not go so far as to assert that in the mediæval romance, everything is of native or "Gothic" origin; the fact is very much the reverse. This extreme theory, propounded by Mallet, and supported by Bishop Percy and other writers, is totally inadequate to account for all that is contained in these romances. Not less inadequate is another theory, first suggested by Salmasius, and afterwards elaborated by Warton, that the mediæval romance is mainly of Saracenic origin, and was probably introduced by the Moorish conquerors into Spain, and thence propagated into France and Britain; while a third theory, which has also found supporters, viz., that it was derived from the classical mythology of ancient Greece, is the most inadequate of all. The true explanation of the matter appears to be, that mediæval romance had its root and foundation in Chivalry (q. v.)—a genuine product of Western Europe—and although the machinery, so to speak, the exploits and the marvels, may have often been derived from the foreign sources we have mentioned, yet the spirit, scenery, sentiment, and life of the legends thoroughly reflect the characteristics of the earlier ages of feudalism. The notion of dragons, giants, magic rings, enchanted castles, are probably of Saracenic origin, and may have been introduced into Europe by the horde of pilgrims who visited the East in the time of the Crusades; such incidents as the detaining of a knight from his quest by the enchantments of a sorceress, may have been a tradition of the "Odyssey" of Homer; but the gallantry, the courtesy, the romantic valor, the tournaments, the noble friendships of brother-knights—all that distinguishes the romances of chivalry from Runic legends or the "Arabian Nights," cannot be traced to any other source than the new-born chivalry of Europe.

The mediæval romances are divisible into three great series: 1. Those relating to Arthur and the Knights of the Round Table; 2. Those relating to Charlemagne and his Paladins; 3. Those relating to Amadis de Gaul and his descendants.

The Arthurian series is, in its essence, of Welsh and Armorican origin. Its genesis is as follows. First came the legendary chronicles composed in Wales or Brittany, such as the "De Excidio Britannie" of Gildas (q. v.); the chronicle of Nennius, belonging to the 9th c.; the Armorican collections of Walter Caletius or Gualter, Archdeacon of Oxford; and the famous "Chronicon sive Historia Britonum" of Geoffrey of Monmouth (q. v.)—from these, and from the multitude of floating unrecorded traditions, sprung the *metrical*, which in turn gave birth to, and were ultimately superseded by, the *prose* romances. It is with the latter alone we have here to do. They, like the metrical romances, were composed by Anglo-Norman authors (whose names are unknown) during the 13th, 14th, and 15th centuries, who took all the more willingly to the old British legends, that in these the "Saxons" were the objects of the authors' hatred and detestation. The principal romances of the Arthurian cycle are those of "Merlin" (q. v.), the enchanter; of "Arthur" (q. v.); of the Sangreal (see GRAAL); of "Perceval"; of "Lancelot du Lac"; of the princes of Lyonesse, "Meliadus" and his son "Tristan"; and of "Isaie le Triste," the son of Tristan. They relate the marvellous adventures, exploits, loves, and gallantries of the Knights of the Round Table, and are probably in substance the oldest of the mediæval prose romances. The scenes are generally laid in Wales, Cornwall, Brittany, Ireland, or Scotland; only in one or two of the series are we taken as far

as Egypt or India; and though Arthur is slain by "Saracens" who supported his nephew, Mordred, and a general eastern coloring is present in the cycle, yet it is "Saxons" who are his principal foes.

The series of Charlemagne and his Paladins is of purely French origin, and originated in a somewhat similar fashion to the Arthurian cycle; that is to say, there was first a legendary chronicle (in verse, however), entitled "*Historia de Vita Caroli Magdi et Rolandi*," erroneously attributed to Turpin or Tipin, Archbishop of Rheims, and contemporary of Charlemagne, but probably executed in the 11th or 12th c.; then came a series of metrical romances, strictly so called, which were gradually supplanted by their prose counterparts, the authors of which last, however, appear to have diverged more from the metrical originals, and to have been more free and fanciful than their predecessors of the Arthurian cycle. The principal are "*Huon of Bordeaux*" (the incidents of which are followed by Wieland in his "*Oberon*"), "*Guerri de Monglave*, *Gaylen Rhetoré*" (in which Charlemagne and his Paladins proceed *incognito* to the Holy Land), "*Miles and Ames*, *Jourdain de Blaves*, *Doolin de Mayence*, *Ogier le Danois*," and "*Maugis the Enchanter*." In these romances we are, in some respects, on totally different ground from that on which we find ourselves in the Arthurian series. We are transferred to the East—to Africa, Palestine, Arabia, Bagdad, Constantinople, India, Persia, the Caspian Sea, &c. We are introduced to the courts of Saracen "princes," "sultans," and "emirs;" and see Mohammedan maidens of peerless beauty falling in love with Christian knights, and for their sake abandoning, or even betraying father, mother, brethren, and kinsmen. Fairies, who figure but slightly in the Arthurian romances, play a frequent and an important part in these; demons, dervishes, apes, talismans, palaces with cupolas and gilded roofs, splendid jewels, diamonds, &c.—everything, in fact, shews the influence exercised on the imagination of Western Europe by the glowing scenery, the brilliant life, and the gorgeously fanciful superstitious of oriental lands.

The series relating to Amadis de Gaul and his descendants is sufficiently characterised under the head of AMADIS (q. v.). We may only observe, as a proof of the comparative lateness of their composition, that the "Saracens" of the French romances here give place to "Turks;" and as the eyes of Europe were turned towards the tottering Greek empire, many of the scenes of warfare are laid at Constantinople.

Besides the three distinct series of romance above mentioned, a fourth perhaps deserves mention, in which the heroes of antiquity are grotesquely tricked out in the costume of medieval knights. The exact date of their composition cannot be ascertained, but they were probably later in general than any of the other three series; and, at any rate, were for the most part not published till the end of the 15th and the beginning of the 16th centuries. The principal are the romance of "*Jason and Medea*," of "*Hercules*," of "*Edipus*," and of "*Alexander*." They are all written in French, and the first two profess to be the work of a Raoul le Febvre. An attempt is made to adhere, in the general outline of the stories, to the ancient myths, but most marvelous embellishments are added, such as only the middle ages could have conceived; while the transformations that the classical personages undergo are exceedingly ludicrous. Jove becomes a "king;" Mercury his "squire;" the Fates, "*duennas*;" Cerberus and the Sphinx, "giants;" &c.

Before leaving this division of our subject, we would observe that, though the romances of chivalry may appear infinitely tedious and absurd to a modern reader, they were immensely relished and admired during the ages in which they were produced, were widely disseminated, in different forms, throughout all Christendom, and were highly popular with later poets. The influence which they exercised on Pulci, Boiardo, Tasso, Spenser, &c., shews the strong hold that they must have had on the imagination of Europe; but with the decline of chivalry, the spread of the more rational and artistic fictions of the Italian novelists, the revival of letters, and the general advancement in civilisation of Christendom, the taste for the romances of chivalry also declined, until finally Cervantes laughed them out of literature, and well-nigh out of memory, in the beginning of the 17th century.

3. *Development and Influence of Fiction in Italy.*—The Italians originated no romances of the kind described above. This resulted from various causes, the principal of which perhaps are; 1st, that they were really not a Gothic, but at least a semi-classic people; 2d, that they were more polished than the northern nations; and 3d, that instead of feudal chivalric institutions, the most characteristic political



features of Italy, during the middle ages, were mercantile and lettered republics. There was what may be roughly called a *middle class*—of merchants—in Italy, when England and France, and Spain, contained really little more than nobles and serfs; and these were really the best instructed and the most enlightened portion of the community. Hence it is but natural that we should find a style of fiction mirroring to some extent this more civilised and sober form of social life. That the classical romances had some influence on the development of Italian fiction, is probable; several of the tales recorded in the love-letters of Aristænetus, and in the "Golden Ass" of Apuleius, are quite like what we read in Boccaccio and others. The fables of Pilpai or Bidpai (q. v.), translated into Latin as early as the 13th c., were also not without a certain effect; but it is to the Arabico-Indian book of the seven counsellors (better known as "The Tales of the Seven Wise Masters"), still more to the stories of Petrus Alphonsus (whose work is entitled "De Clericæ Disziplinæ"), and the "Gesta Romanorum" (q. v.), a grotesque jumble of classical stories, Arabian apologues, and monkish legends, in the disguise of romantic fiction; but most of all perhaps to the "Contes" and "Fables" (q. v.) of the French poets, that we must look for the first sources of those almost innumerable *novellotti* which mark the earlier literary history of Italy.

The earliest Italian work of this sort is the "Cento Novelle Antiche," commonly called "Il Novellino." It is a compilation by different hands—all unknown—of stories floating about, or taken with modifications from the sources above mentioned, with one or two of the more graceful episodes in the romances of chivalry, and was executed towards the close of the 13th century. It was followed in 1353 by the "Decamerone" of Boccaccio (q. v.)—the finest, in point of humor, sentiment, and style, of the whole set, but not more original in the matter of story than "Il Novellino." Its influence on early European literature was prodigious. Chaucer and Shakespeare in England have been in particular greatly indebted to it for incidents and plots; while in France—from whose *Trouvères* he had himself derived so much—Boccaccio had a number of distinguished imitators. In his own country, his influence was so overwhelming, that for some centuries Italian novelists could do nothing more than attempt to copy him. The principal of these imitators are Franco Sacchetti (1335–1410), Ser Giovanni (who began to write his *novellotti* in 1378, from which Molière got the plot of his "Ecole des Femmes," and Shakespeare probably part of his story of the "Merchant of Venice")—though the story of the bond is far older, and is of Persian origin—Chaucer is also indebted to this Italian; Massaccio di Salerno (flor. about 1470), more original than most of the post-Boccaccian novelists; Sabadino degli Arienti (flor. about 1483); Agnolo Firenzuolo; Luigi da Porta; Molza, and Giovanni Brevis (flor. at the close of the 15th, and in the first half of the 16th c.); Girolamo Parabosco (flor. 1550); Marco Cademoste da Lodi (1544); and Giovanni Giraldo Cinthio (died 1573), noted particularly for his extravagant employment of sanguinary incidents, and the introduction of scenes of incredible atrocity and accumulated horrors. The seventh of his third decade of stories contains the story of Othello, the Moor of Venice; the plot of "Measure for Measure" was also derived indirectly from him. Cinthio was, in fact, the greatest favorite of all the Italian novelists with the Elizabethan dramatists. Besides these, we may further mention Antonio Francesco Grazzini (died 1583); Straparolo (wrote 1554 *et seq.*); from whom Molière, and also the French writers of fairy tales, derived numerous hints; while the ludicrous incident embodied in the Scottish song of "The bairn' o' our door," forms one of the stories of this writer; Bandello (died 1555), the most widely known and read (out of Italy) of all the Italian novelists next to Boccaccio, and in whom we find the original of Massinger's play of "The Picture," and of Shakespeare's "Twelfth Night;" Graucucci (published 1574); Malespini (published 1609); and Campeggi (early part of 17th century).—The best French imitations of these Italian tales are the "Cent Nouvelles Nouvelles" (printed 1456, and translated into English under the title of the "Hundredth Mery Tales," 1557). They are full of life, gaiety, and imagination, and are written in a most naive and agreeable manner; and the "Heptameron" of Margaret, Queen of Navarre, from which Shirley, the English dramatist, has taken the plots of two of his comedies.

A few words may also be devoted here in passing to a very different class of fiction—the "Spiritual Romance." It originated, without doubt, in the bosom of the

church, and from the desire to edify, by stories of religious knight-errantry, a rude and ignorant community, incapable of understanding or relishing abstract doctrines. The first of the series is "Barlaam and Josaphat," already alluded to; but by far the greatest work of the kind produced during the middle ages is the "Legenda Aurea," or Golden Legend (q. v.)—itself believed to be drawn from different and now partly forgotten sources. Besides these, may be mentioned a species of spiritual tale—the "Contes Dévoits," prevalent in France during the 12th and 13th centuries, and which were written by monks, probably with the view of counteracting the witty and licentious stories of the Trouvères; but curiously enough, in these pious fictions, the lives of monks and nuns are represented as far more immoral than in those of the secular satirists. The things, too, which the Virgin Mary is represented as doing are most astounding, and throw a strange but valuable light upon the religious notions of the age. In one story, she conceals the shame of a favorite nun; in another, she performs the part of a procuress; in a third, she officiates as midwife to an abbess who had been frail and imprudent; and in general, she performs the most degrading offices for the most worthless characters.

*Romance of the 16th and 17th Centuries.*—During the middle ages, the universal sway of the church and the institutions of feudalism gave a certain character of uniformity to the modes of life, and thereby to the social literature of Western Europe; but after the epoch of the Reformation, and even earlier, this uniformity disappears, and we find in every direction a tendency to the opposite extreme of individualism. This tendency manifests itself especially in the fiction of the period, which, vastly increasing in quantity and varying in quality, becomes difficult to classify. We shall, however, endeavor to group the products of modern prose-fiction works under what appears to us a convenient chronological heading.

During the 16th and 17th centuries, four different kinds of romance or novel were cultivated—

1. *The Comic Romance*; 2. *The Political Romance*; 3. *The Pastoral Romance*; 4. *The Heroic Romance*.

*Comic Romance* substantially begins in modern times with Rabelais (q. v.), styled by Sir William Temple the *Father of Ridicule*. Others, indeed, had preceded him in the same path, but they had acquired no celebrity. In him we see unmistakably one form of the modern spirit—its daring freedom of speculation, criticism, and satire, also that lack of reverence exhibited by those who, at the period of the Reformation, clearly discerned the abuses of the church, but had not faith in the possibility or efficacy of reforms. Thus, Rabelais, in his inimitable burlesque-romance, scoffs (with the tone of a sceptic, however) at the vices of the clergy, the crooked ways of politicians, the jargon of philosophers, and the absurdities of the *contes dévots*, and of the mediæval tales generally. The next remarkable romance of a comic nature is the "Vita di Bertoldo" of Julio Cesare Croce (flor. at the close of the 16th c.), a work recounting the humorous and successful exploits of a clever but ugly peasant, and regarding which we are told that for two centuries it was as popular in Italy as "Robinson Crusoe" or the "Pilgrim's Progress" in England. The substance of the story can be traced back to an oriental source. A few years later appeared "Don Quixote" (see CERVANTES), in which "war to the knife" was proclaimed against the romances of chivalry, and in which, perhaps, we see, more distinctly than in any other fiction of the period, the new turn that the mind of Western Europe had taken. Almost contemporaneous with "Don Quixote" was another Spanish romance—Matteo Aleman's "Life of Guzman Alfarache," successively beggar, swindler, pander, student, and galley-slave. In this work, as in others of the same sort, we find several indications of the influence of the Italian novelists. It has been supposed that "Guzman Alfarache" suggested to Le Sage the idea of "Gil Blas," and there is some resemblance between the two; but, at any rate, it gave birth to a host of Spanish romances with beggars and scamps for heroes, of which the best is the "Lazarillo de Tormes," by Diego de Mendoza (1586). In the following century, France produced, among others, Scarron's "Roman Comique," and Furetière's "Roman Bourgeois." England and Germany have nothing to shew in this department.

*Political Romance* was manifestly suggested partly by the great politico-ecclesiastical changes that took place in Europe in the first half of the 16th c., and partly by the immense increase in the knowledge of the manners and customs of remote

nations, occasioned by geographical discoveries and mercantile adventure. The earliest of the series is the "Utopia" of Sir Thomas More; next comes the "Argenis" of Barclay, published in 1621; and to the same class belong a variety of French romances produced about the close of the 17th and the beginning of the 18th c., of which by far the most famous is the "Télémaque" of Fenelon.

*Pastoral Romance.*—All through the middle ages, the fame of Virgil kept up a certain interest in compositions devoted to the delineation of rustic or shepherd life. We even find in the poems of the Troubadours several specimens of the rustic pastoral; and the "Ameto" of Boccaccio furnishes us with a prose illustration of the same. But it was after the revival of letters that this branch of fiction, so essentially classical, was most assiduously cultivated by men of scholarly genius; and though their works have not retained the popularity they originally enjoyed, they are still interesting and valuable from an historical point of view, and abound in descriptive passages of great beauty and sweetness. The pastoral life which they portray, however, never existed either in Greece or elsewhere. Their shepherds and shepherdesses are as unreal and unhistorical beings as the knights of medieval romance. The first important work of the kind is the "Arcadia" of Sannazzaro, written in Italian, about the end of the 15th century. It was followed by the "Diana" of Montemayor, written in Spanish, about the middle of the 16th c., several of the episodes of which are borrowed from the Italian novelists; while Shakespeare has in turn directly taken from it the plot of the "Two Gentlemen of Verona," copying occasionally the very language, as well as some of the most amusing incidents in his "Midsummer Night's Dream." The "Diana" was imitated in French by Honoré d'Urfé whose "Astrée" (1610–1625) was for a long while held in the highest esteem, and is really, in spite of its tediousness, a work of great learning and considerable merit. Twenty years before the appearance of "Astrée," Sir Philip Sidney wrote and published his "Arcadia," as tiresome, and in its substance as unreal, as any production of the same school, but in stateliness and melody of language, in luxury of fancy, in nobility and purity of sentiment, far exceeding them all.

*Heroic Romance* owed its origin partly to the immediate antecedent pastoral romance, partly to an increased acquaintance with classic history, produced by the translation of such books as "Plutarch's Lives," and partly to the interest excited in the Moors of Granada by a splendid romance in Spanish (professing, however, to be a *history*), entitled "The Disensions of the Zegrís and the Abencerrages," and was printed at Alcalá in 1604, and which soon became extremely popular, especially in France. It was in the latter country alone that the "Romans de Longue Haine" (Long-winded Romances), as they have been happily nicknamed, were cultivated. The first of this heavy series was the "Polexandre" of Gomberville, published in 1632, in which the influence of the early Greek romances is visible. His successor, Calprenède, the best of a bad lot, wrote "Cleopatra," "Cassandra," and "Pharamond." But the most prolific, and consequently the most intolerable of the school, is Madame de Scudéri, whose principal romances are "Ibrahim ou l'illustre Bassa," "Clelie," "Histoire Romaine," "Artamène ou le Grand Cyrus," and "Almahide." The pompous dignity, the hyper-polite address, the dreadful dullness, and the hollow ceremoniousness of these ridiculous performances, admirably (if unintentionally) mirror the features of French court-life during the time of the *Grand Monarque*. The heroic romances did not long retain their meretricious reputation. Molière, and still more, Boileau in his satire "Les Héros de Roman, Dialogue," ridiculed them to death, and in consequence, Madame de Scudéri had no successor.

**NOVELS AND ROMANCES OF THE 18TH CENTURY.**—The two European nations that most brilliantly distinguished themselves in the department of fiction during this century were England and France, and to those we shall chiefly confine our attention.

1. *English Prose Fiction.*—During the age of Elizabeth and her immediate successors, the imaginative genius of England, from various causes, had taken an almost exclusively poetical direction, and with the exception of Sidney's pastoral of "Arcadia," and Bunyan's "Pilgrim's Progress," we meet with nothing in the shape of a novel or a romance for a hundred years. The 17th c. has nothing to shew till it approaches its close. This is doubtless owing, in part at least, to the intensity of the great political struggle that agitated and rent England during the first half of that century, and gave an austere theological bias to society. The Pur-

tans, in their day of triumph, would not tolerate either comic or heroic romances. They set their faces "like flint" against all imaginative fiction, which they considered as little better than lying; and even to this day that class of people commonly described as "the religious portion of the community," in some sense the representatives of the Puritans, betray the legitimacy of their spiritual descent by their aversion to all sorts of secular tales. After the Restoration, however, an extraordinary change came over the English nation, or at least over the upper and wealthier classes. These rioted in the excess of a coarse and licentious reaction against the rigorous piety and fanaticism of the Commonwealth. This turbid viciousness by and by calmed down, but it left a certain taint of sensualism and materialism in the habits and life of the people, which, in the opinion of some competent critics, marks them to this day. It is certain that at the beginning of the 18th c. England was entering on the most prosaic, unimaginative, and unheroical period of her history. Its characteristics are faithfully reflected in most of her novels, which, as pictures of the gross dull life, the paltry thoughts, the low sentiments, the modish manners, and the loose morality that prevailed, possess a great historical value apart altogether from their literary merits. The first name that occurs is that of the notorious *Aphra Behn* (q. v.), the greater number of whose novels, of which "*Oronoko*" is the best known, appeared towards the close of the reign of Charles II., but are included here in the literature of the 18th c., as they belong to it by the nature of their contents, and not to the 17th c. types of fiction. She was imitated by Mrs Heywood (born 1696, died 1756), of whose "*Love in Excess*," "*The British Recluse*," and "*The Injured Husband*," it has been remarked, that "the male characters are in the highest degree licentious, and the females as impassioned as the Sarracen princesses in the Spanish romances of chivalry." A later work, however, "*The History of Miss Betsey Thoughtless*," is of a higher stamp, and is supposed to have suggested the plan of Miss Burney's "*Evelina*." But the first novelist of great genius belonging to the new era is Daniel De Foe (q. v.), the father of modern English prose fiction, in whose writings—"The Adventures of Captain Singleton," "*The Fortunes of Moll Flanders*," "*The History of Colonel Jack*," &c.—the coarse, homely, unpoetical, but vigorous *realism* of the time is strikingly apparent. Perhaps the Spanish ragamuffin romances may have furnished him with some hints. "*Robinson Crusoe*" is the finest and the most famous of all that class of fiction which was extensively cultivated both in France and England during the earlier part of the 18th c., and which received, in the former country, the name of *Voyages Imaginaires*. To the same class (outwardly at least) belong Swift's "*Gulliver's Travels*," though at bottom this is a satirical romance, like the works of Rabelais, and the "*Gaudetio di Lucca*," a sort of politico-geographical fiction, generally attributed to Bishop Berkeley. After De Foe comes Richardson (q. v.), very unlike any of the novelists of his age—to appearance. His *Misc* is a most decorous prude, and never utters anything rude, or vulgar, or licentious; but though she was inspired with the best intentions, her notions of how virtue should be rewarded indicate the coarseness of the time, hardly less than the debaucheries and seductions of Fielding and Smollett. The principal novels of Richardson are, "*Pamela*," "*Sir Charles Grandison*," and "*Clarissa Harlowe*." Fielding (q. v.) thought Richardson untrue to nature, and wrote his first novel of "*Joseph Andrews*" as a burlesque on the style of his predecessor. Like his subsequent performances, "*Tom Jones*" and "*Amelia*," it represents society as Fielding's sharper eyes saw it, on the whole, gross, vulgar, and impure. Smollett (q. v.), with a different style of genius, continues to paint in the same spirit. His chief works are, "*Roderick Random*," "*Peregrine Pickle*," "*The Adventures of Ferdinand Count Fathom*," and "*Humphry Clinker*." Sterne (q. v.), belonging to the same period, exhibits a genius so whimsical, peculiar, and original, that it is almost impossible to class him with any of his contemporaries. His "*Tristram Shandy*" is a work *sui generis*, but nowhere is the coarse impurity and indelicacy of the age more conspicuous. Four years later, appeared Goldsmith's "*Vicar of Wakefield*," in which a change for the better, in a moral point of view, is first noticeable. With the exception of Richardson, all the novelists above mentioned are usually, and we may add correctly, described as *humorists*. Other qualities they have besides, but this is the most common and predominant. When this school was passing away about 1760-1770, another was on the eve of being born. The publica-

tion of Percy's "Reliques" had re-awakened an interest in the age of chivalry and romance. Readers had become tired of the long prevalence of prosaic fiction, in spite of the splendid genius devoted to its illustration. It had done its work, and could create no more. The first of the modern romantic school was Horace Walpole, whose "Castle of Otranto" appeared in 1769. It was followed by Clara Reeve, the authoress of the "Old English Baron," a romance that every school-boy, we hope, remembers with the deepest gratitude; but the greatest genius in this line was undoubtedly Mrs Radcliffe (q. v.), whose "Mysteries of Udolpho" and other works, though now almost forgotten, were once greedily devoured and abundantly imitated. The ablest of her successors were Matthew Gregory Lewis, author of "The Monk" (1796), and Maturin, author of "Montorio" (1803). In all the romances of this school, the incidents are of the most startling, terrible, and often supernatural character, and the scenery is in keeping with the incidents. Fierce barons, mysterious bandits, persecuted maidens, gloomy castles, secret passages, deep forests, murders, ghosts, haunted chambers, &c.; everything that could charm, by way of contrast, and pleasantly horrify the languid, matter-of-fact, sceptical 18th c., is to be found in their exaggerated pages.

A few novelists remain to be mentioned who are incapable of particular classification. These are Dr John Moore (q. v.), author of "Zeluco," &c.; Godwin (q. v.), author of "Caleb Williams," "St Leon," &c., in whom the free-thinking and revolutionary spirit that seized many minds after 1789 is conspicuous; Mrs Inchbald ("Nature and Art, A Simple Story," &c.); Charlotte Smith ("Old Manor House," &c.); Miss Austen ("Pride and Prejudice, Emma, Persuasion"); and Maria Edgeworth, whose sketches of Irish character first suggested to Walter Scott the idea of attempting for Scotland a series of like illustrations.

2. *French Prose Fiction in the 18th Century.*—It is not easy—perhaps not possible—to trace the causes that led to the cultivation of the different kinds of fiction which flourished in France during this century, and particularly during the first half of it. The natural love of change—of novelty; the accidental influences of foreign literature; the disposition, so peculiarly French, to satirise prevalent follies and vices; the wish, on the other hand, to amuse the leisure moments of a luxurious, superstitious, and profligate society; all these and many other causes unquestionably assisted in determining its diverse development. Four kinds have been distinguished: 1. "Pseudo-historical Romance," the literature in which department, although copious enough, neither deserves nor requires special notice; 2. "Romance in which the incidents, though natural, are purely imaginary;" 3. "Satirico-moral Romance;" 4. "Fairy Tales," to which may be associated the imitations of "Oriental Tales," and the "*Voyages Imaginaires*."

2. *Romance in which the incidents, though natural, are purely imaginary.*—This class more nearly corresponds with the modern conception of the novel than any of its predecessors, and probably had its prototype in "*La Princesse de Clèves*" and "*Zaide*," by the Comtesse de Lafayette, who flourished in the latter half of the 17th c.; but the first great name that adorns it is that of Marivaux (1688—1763), whose "*Vie de Marianne*" and "*Paysan Parvenu*" were long in high favor. They have this in common with the contemporary English fiction, that everything in them is produced by ordinary means, and the interest of the reader is sought to be awakened by the vivid and powerful portraiture of natural feelings, while the incidents, if often highly romantic, are always sufficiently probable to insure the credence of the imagination. Next to Marivaux comes the Abbé Prevot, q. v. (1697—1763), who first "carried the terrors of tragedy into the novel." He was a most voluminous writer, but the work by which he is now chiefly remembered is "*Manon L'Escat*," recommending the adventures of a kept-mistress and swindler, the purpose of which appears to be similar to that of "*La Dame aux Camelias*" of Dumas *filz*—viz., to show how noble, true-hearted, and self-sacrificing a prostitute may be! Other writers belonging more or less strictly to the same division are Madame Riccoboni (flor. 1750) and Rousseau (q. v.), in whose "*Heloise*" we begin to see the dawn of that fierce natural impure passion, and that extravagant scorn of conventional life, that culminated in the sanguinary paroxysms of the Revolution.

3. *Humorous and Satirical Romance.*—By far the most celebrated specimens of this kind of fiction produced in France during the 18th c. are the "*Gli Blas*," the "*Diable Boiteux*," and "*Le Bachelier de Salamanque*" of Le Sage, q. v. (1663—1746),

all of which were suggested by the prolific comic romancists of Spain, Juan de Lana, Quevedo, Cervantes, Espinel, from some of whom he has borrowed, with hardly any variation, whole scenes and stories, as well as from more ancient sources. The best parts, however, are his own, and the spirit of the work is thoroughly French in the gay and lightsome vivacity of its humor. It is with some hesitation that we place the younger Crébillon (q. v.) in the same category, for the licentiousness of his "Egarements du Cœur et de l'Esprit," and other novels, is far more apparent than their satire or humor. Bastide and Diderot (q. v.) hold an equally doubtful position as satirists or humorists; but Voltaire (q. v.) may fairly claim to rank among the former, in virtue of his "Candide," "Zadig," "L'Ingénu," "La Princesse de Babylone," &c., most of which contain covert attacks on superstition and despotism, under the forms in which Voltaire best knew them. Voltaire, however, had not a rich imagination, and, in consequence, has been obliged to help himself liberally in the matter of incident from older writers.

4. *Fairy Tales, &c.*—A very careful inquiry might probably succeed in tracing back this kind of literature to the early intercourse of Christian and Moorish nations, but the first work in which we find definite examples of fairy tales is the "Nights" of the Italian novelist Straparola, translated into French in 1585. In this collection are found at least the outlines of some of the best-known stories of the sort, such as "Le Chat Botté" (Puss in Boots), "Prince Marcassin," "Blanche-belle," and "Fortunatus." The immediate forerunner and prototype, however, of the French fairy tales was the "Pentamerone" of Sigur Basilic, written in the Neapolitan *patois*, and published in 1672. This work attracted and stimulated the fancy of M. Charles Perrault (q. v.), whose "Histoires ou Contes du Temps passé" appeared in 1697, and is incomparably the most naïve and charming of all the collections of fairy tales. The titles of some of his *contes* will recall many a literary feast of our childhood—"La Barbe Bleue" (Bluebeard), "La Belle au Bois Dormant" (The Sleeping Beauty, to which, by the by, Tennyson has given a poetic immortality), "Le Chat Botté" (Puss in Boots), "Riquet à la Houppe" (Riquet with the Tuft), and "Le Petit Chaperon Rouge" (Little Red Riding Hood). The principal successors of Perrault were the Comtesse d'Aunoy (see AUNOY), Madame Murat, and Mademoiselle de la Force; but their stories are much more extravagant and forced than those of the illustrious academician. The same censure, however, is not applicable to "Les Contes Marins" (1740), by Madame Villeneuve, among which occurs the tale entitled "La Belle et la Bête" (Beauty and the Beast), perhaps the most beautiful creation in the whole circle of this fantastic form of fiction.

Meanwhile, the translation of the "Arabian Nights' Entertainments" (q. v.) by Galland, 1704–1717, and of numerous other Arabic and Persian works, the great encouragement extended to the literature of the East in the 17th and 18th centuries, the publication of the "Bibliothèque Orientale" of D'Herbelot, &c., created a taste for the brilliant exaggerations of oriental fiction, and a variety of works were soon in the field, swarming with necromancers, dervishes, califs, bashaws, viziers, cadis, eunuchs, slaves. The most notable of these are—"Les Mille et un Quart d'Heure, Contes Tartares;" "Les Contes Chinois, ou les Aventures Merveilleuses du Mandarin Fum-hoam;" and "Les Sultanes de Guzaratte, Contes Mongols," of M. Goulette.—Of the class of fictions known as "Voyages Imaginaires," the principal are the "Histoire Comique des Etats et Empires de la Lune," and the "Estats et Empires du Soleil" of Cyrano Bergerac, which materially influenced the genius of Swift, who has, in fact, borrowed not a little from the first of these in his "Gulliver's Travels," and which were themselves partly suggested by the Spanish romance of Dominico Gonzales, entitled "The Man in the Moon." Such novels as the "Paul et Virginie" of Bernardin St Pierre, which appeared towards the end of the 18th c., do not come under any of the four heads, but may most conveniently be mentioned here.

*Prose Fiction of Germany during the 18th and 19th Centuries.*—The limits of our space will not permit us to do more than superficially indicate the development of this branch of literature in Germany, which, however, is the less to be regretted, as, during the greater part of the 18th c., it did not attain much distinction. Towards the close of the century, however, writers became more numerous, and as the literary activity of many of them continued on till the first or second quarter of the 19th c.,

it will be most convenient and natural to treat both centuries together, as they, properly speaking, form only one area in the literary history of that nation.

The first eminent German novelist of this period was Wieland (q. v.), whose Greek romances, "Agathon," "Aristippus," "Socrates," &c., are of that didactic and sceptical character which was beginning to mark the reflective genius of the continent, and which has since produced such immense changes in all departments of thought. Wieland was followed by a crowd of writers, in whose productions is more or less distinctly apparent the influence of the English novelists, particularly of Richardson and Fielding, who had been translated and carefully studied in Germany, where, however, the "novel of manners," whether serious or comic, dealt more largely in the representation of "family life." The principal names are Augustin Fontaine, Weizel, Müller (whose "Siegfried von Lindenberg" is still remembered and read), Schulz, and Hippel. Almost contemporary with these quiet and somewhat prosaic novelists, there flourished for a brief period (1790—1800) a school of an entirely opposite character, whose works, fiercely and outrageously romantic, had their poetic counterpart in Schiller's "Robbers." They resemble in their style of handling the feudal ages, the English romances of Mrs Radcliffe and others, which probably suggested them. The chief writers of this "turbulent school of fiction," as it has been called, are Cramer, Spiers, Schlenker, and Velt Weber.

Alone, and far above all others in redundancy and originality of fancy, humor, and pathos, towers Jean Paul Richter (q. v.), who is incapable of classification, and to whom, therefore, his countrymen have affixed the epithet of "Der Einzige" (The Unique). Apart from all schools—in this respect, but in this only, like Richter—stands Johann Wolfgang Goethe (q. v.), whose novels, as well as his poems, are poetico-philosophic efforts to represent, perhaps to solve, the great facts and problems of human life and destiny.

The reaction from the materialism and irreligious levity of French thought, first shewed itself in Germany towards the close of the 18th c., in a certain earnest love and study of the old, simple, superstitious, and poetical beliefs of the middle ages. Hence originated the exquisite class of fictions called "Volksmärchen" (popular legends or tales), in which the Germans have never been equalled. The most illustrious cultivator of this species of fiction is Ludwig Tieck (q. v.), for Musens (q. v.), though gifted with admirable powers of narration, is marked by a sceptical humor and irony, not altogether compatible with an imaginative conception of his subject. Other distinguished names are those of De la Motte Fouqué (q. v.), Chamisso (q. v.), Heinrich Steffens, Achim von Arnim (q. v.), Clemens Brentano (q. v.), Zachow, and Hoffmann (q. v.). More recent novelists of note are Auerbach, Freytag, and Paul Heyse. The tales of Fritz Renter, written in the Platt or Low German, are original and delightful.

**NOVELS AND ROMANCES OF THE 19TH CENTURY.**—These have been produced in such overwhelming quantity, that volumes would be required merely to classify and characterise them. The vast and rapid increase in the material facilities of intercourse among European nations, which has taken place during the last forty years, has, among other results, tended to diffuse through each country the literary products of all the others, especially those of an entertaining kind; and these have in turn more or less stimulated the imagination of native genius, so that at present there is hardly a people in Europe, not even excluding Turkey, which has not contributed something to the enormous stock of fiction belonging to the 19th century. It would be altogether out of the question to attempt, in a compendious work like the present, a notice, however brief, of the principal novels and romances of every European nation; we can only refer to the historical surveys of literature, to be found under such heads as BELGIUM, BOHEMIA, HUNGARY, NETHERLANDS, NORWAY, POLAND, SWEDEN, TURKEY, &c., and to individual biographies of eminent continental novelists. Even in regard to England and France, we can do little more than catalogue a few prominent names.

1. *English Fiction.*—Almost the first novelist that we encounter in the 19th c., Sir Walter Scott (q. v.), is probably the greatest that England, or even the world, has ever seen. Here, however, we have less to do with his personal rank in literature than with the kind of fiction that he cultivated. In a qualified sense, he may be regarded as a continuation of the romantic school, but it must be observed that he is free from all their monstrosities, spasms, tricks, and horrible machinery. Possessed

at once of far greater antiquarian learning, imaginative genius, sound sense, and instinctive taste, than any of his "romantic" predecessors, he knew precisely what to shun and what to choose; and though his Feudal Age, as depicted in "Ivanhoe," "The Fair Maid of Perth," &c., is a considerably idealised portrait of the rugged facts, it is a portrait, and not like Horace Walpole and Mrs Radcliffe's performances, a furious caricature. The political reaction that took place in Britain, after the sanguinary excesses of the French Revolution, assuming the form of a new and passionate attachment to venerable and time-honoured traditions, shewed itself in literature too, and Sir Walter Scott was its grandest representative. He strove to delineate the Past, as it seemed in the eyes of men who were dubious of the Present, and afraid of the Future—noble, stately, glittering, and gay, with the pulse of life ever beating to heroic measures. The overpowering genius of Scott necessarily but unhappily (for the comfort of readers) led to "endless imitation," but the only one of his followers that held for a time a tolerably decent position in literature is G. P. R. James (q. v.). Galt (q. v.) and Wilson (q. v.), the former with vulgar but racy humor, and the latter with a highly sentimental and overdone pathos, portrayed aspects of Scottish life which the author of "Waverley" has passed over. Other novelists, such as Lockhart (q. v.), Miss Ferrier (q. v.), and Mrs Johnstone, do not call for special notice; neither does Hope (q. v.), though his "Memoirs of Annetasius" is a most brilliant and powerful book; nor Moore (q. v.), though his "Epicurean" has all the sparkling and superficial splendors of his verse. After Scott, the next novelist who distinctly marks a new stage in the development of fiction, is Sir Edward Bulwer Lytton (q. v.), in whose earlier works at least we find something like a reflection of the cold, sneering, selfish, and sensual spirit that marked the upper classes during the period of the Regency; but the versatile genius of this author, and the different fields in which he has won renown, would make it quite unfair to define him as a merely "fashionable" novelist, though his first and least meritorious distinctions were acquired in that capacity, and students of "Sartor Resartus" are apt to so remember him. Of fashionable novelists, strictly so called, the best known are Mrs Gore (q. v.) and Theodore Hook (q. v.). This class was succeeded by another infinitely worse than itself—the *Neuigate novelists*, as they have been well termed, who sought for their heroes among highwaymen, thieves, desperadoes, and murderers, like Jack Sheppard, Blueskin, Dick Turpin, Claude Duval, &c., and, flagitiously indifferent alike to fact and morality, labored with pernicious success to invest the lives of these scoundrels with a halo of romantic interest and dignity. The chief of this school, "by merit raised to that bad eminence," is William Harrison Ainsworth (q. v.). During the last thirty years, novels have been multiplied to a degree which is almost alarming, and literally incalculable. The greatest names are unquestionably those of Dickens (q. v.), Thackeray (q. v.), and Miss Evans (q. v.); but besides these might be mentioned a host of others, who have attained either celebrity or popularity, or both. Every mode of life, and every kind of opinion, social, artistic, scientific, philosophical, and religious, has sought to recommend itself by adopting this fascinating garb. We have the nautical novels of Marryat (q. v.), redolent, like Dibdin's songs, of the briny deep; the political novels of Disraeli (q. v.); the sporting and military novels of Lever (q. v.); the brilliant "muscular Christian" novels of Kingsley (q. v.); the "governess-novels," as they have been aptly denominated, of Miss Brontë (q. v.); the "school" novels of Hughes and Farrar; and the "sensational" novels of Wilkie Collins, Miss Braddon, and others. Other authors not less eminent, but not so easily classified, are Mrs Gaskell, Mrs Norton, Miss Mulock (now Mrs Craik), Mrs Oliphant (q. v.), Charles Reade (q. v.), George MacDonald; the name of Whyte-Melville, McCarthy, Blackmore, "Ouida," are well known in various departments of fiction; and recently, William Black has shewn himself an artist of a high class. The extraordinary increase of this potent and therefore perilous branch of literature cannot fail to excite much curious reflection in thoughtful minds.

2.—*French Fiction during the 19th Century.*—A few words are all that we can devote to this part of our subject, though it is far from uninteresting either in a literary or a moral point of view. The effect of the Revolution of 1789 on literature was not immediately beneficial, but the reverse, though it planted the germs of a multitude of new thoughts and aspirations in the mind of Christendom, which have since



yielded, both in France and elsewhere, a prolific harvest of wheat and—tares. The iron despotism of Napoleon crushed nearly all literary expression whatever. His hatred of "ideologues" is well known, but the novel was that species of ideologic composition that came least into collision with the principles of imperialism. Even it, however, could hardly be said to flourish; and the only tolerably gifted writer of fiction who figures during the First Empire is Le Brun, and he was reduced to the necessity of caricaturing the *bourgeoisie*, to which Napoleon had no particular objection, as they were by no means his warmest admirers. Chateaubriand (q. v.) and Madame de Staël (q. v.) are insignificant in this department, and Charles Nodier, though voluminous, was not an original novelist. After the return of the Bourbons, and especially after the revolution of 1830, France began to display a wonderful literary activity, and in particular, its long-repressed faculty of imagination burst into a sudden blossom of poetry and fiction. Even Napoleon, now that he was dead, received a peculiar homage from the class to whom he had never shewn favor or regard, of which the songs of Béranger and "Les Misérables" of Victor Hugo afford us specimens. Unhappily for the purity of its literature, the *régime* of the Restoration, which followed the deliverance of France from a military despotism, was itself a base, corrupt, and profligate thing. The Bourbons came back only to re-enact the follies of their ancestors in the previous century, and the nation soon came to despise, detest, and disbelieve them, and the church which supported them. Hence, a certain reckless levity, and hollow mocking laughter, as of heartless scepticism, pervading those fictions which profess to delineate the realities of current life. Moreover, the sparkling wit, the sunny humor, the pathos, often exquisitely tender and refined, the delicate or deep delineation of character, the occasional fine flash of sentimental enthusiasm, and the poetic witchery of a religious mysticism, cannot blind us to the fact that the substance of most of the recent French fictions is incurably immoral. Paul de Kock (q. v.), Balzac (q. v.), Dumas (q. v.), father and son, Sue (q. v.), Madame Dudevant (q. v.), though wholly dissimilar to each other in the quality of their genius, are woefully alike in the baser element of the national fiction. Victor Hugo (q. v.) and Lamartine (q. v.) are indeed morally far above the rest of their contemporaries, but they are perhaps the only great exceptions that can be mentioned. The "Second Empire" did not improve the tone of the French novel, any more than it improved the tone of French society; but if it be true that when things have reached their worst they begin to mend, the country that has produced "La Dame aux Camélias" is perhaps, as regards the literature of fiction, in a hopeful condition. The tales of Messieurs Erckmann-Chatrian, in addition to their merits as graphic and picturesque delineations of provincial life in France, are honourably distinguished by the absence of all prurient sentimentality and indecent passion.

The prose fiction of Spain and Italy during the 19th c. scarcely requires notice, as the former country has not produced a single work that has forced its way into the general European market, while the latter can boast of only one that has attained that dignity, the "Promessi Sposi" of Manzoni (q. v.); but in a comprehensive sketch like the present, it would be a blemish to omit at least the names of the more eminent Transatlantic novelists, as they have contributed not a little of late years to the stock of English prose fiction. The most notable are Brockden Brown (q. v.), the American Godwin; Fenimore Cooper (q. v.), from whom Europe has been content, on the whole not unwisely, to take its notions of the forests, the prairies, and the red men of the West; Washington Irving (q. v.), Edgar Allan Poe (q. v.), Nathaniel Hawthorne (q. v.), Mrs Beecher Stowe (q. v.), Oliver Wendell Holmes (q. v.), and Bret Harte, in all of whose writings, except in the tales of Poe, is visible the influence of the life, traditions, scenery, and other salient characteristics of the New World. See Dunlop's "History of Fiction" (Lond. 1814), and Wolf's "Allgemeine Geschichte des Romans" (Jena, 1841, 2d edit. 1850).

NOVEMBER (Lat. *novem*, nine) was among the Romans the 9th month of the year, at the time when the year consisted of 10 months; and then contained 30 days. It subsequently was made to contain only 29, but Julius Cæsar gave it 31; and in the reign of Augustus the number was restored to 30, which number it has since retained. November was one of the most important months in connection with the religious ritual of the Romans, and continues in the same position, though for other reasons, in the Roman Catholic ritual. It was known among the Saxons as *Blot-monath*, "blood-month," on account of the

general slaughter of cattle at this time, for winter provision (known for a long time afterwards as *Martinmas beef*) and for sacrifice. This custom was not confined to the Saxons, but prevailed in Northern Germany, and even as far south as Spain.

**NOVGOROD**, an important town of European Russia, capital of the government of the same name, is situated on the Volkhof, near where it issues from Lake Ilmen, 122 miles south-south-east of St Petersburg. It is the cradle of Russian history. In 862, the Norman prince Rurik, of the tribe of Varingo-Ross (whence the name *Russia*), was invited hither by the neighboring tribes, and from him begins the history of the country, and the line of its sovereigns. A monument, commemorative of this event, was erected here, with great pomp, in September 1862. In the 9th c., Oleg, the successor of Rurik, transported the capital to Kiev; but bestowed many privileges and liberties upon N., and from that time it began to prosper. The greatness of N. provoked the jealousy of the princes of Moscow, and in 1471 the czar Ivan III. nearly destroyed the town, bereft it of its liberties, and exiled the most influential citizens. During the time of its prosperity, the town was called *Novgorod the Great*; and had 400,000 inhabitants, and extended its sway to the White Sea and the river Petchora. Its government was a sort of republic, the prince being less a sovereign than the chief commander of the troops. Its greatness was due to its vast foreign trade alone, and when Archangel was opened for English trading vessels, but especially after the foundation of St Petersburg, its trade fell away, and the town rapidly declined. Of the existing ancient buildings, the most remarkable are the Church of St Sophia, founded in the 11th c., possessing a fine old library, as well as some remarkable paintings and tombs; and the Kremlin, in the steeple of which hung the famous bell used to summon the citizens for the deliberation of state affairs. Pop. (1867) 16,722.

**NOVGORO'D**, a government of Great Russia, extends immediately south-east of the government of St Petersburg. Area, 48,780 sq. m.; pop. (1870) 1,011,445. The surface is gently undulating, with the Valdai Hills in the south, which rise to about 800 feet, and may be said to form the water-shed between the Baltic, Caspian, and White Seas. The government contains many lakes and rivers; of the former, the lakes Ilmen and Bieloe are the largest; and of the latter, the Volchof, Msta, Szeksua, and Mologa are the most important. The rivers are connected by canals, which are of great service to trade. The soil, especially in the north-east, is not fertile, and the climate is severe; agriculture and cattle-rearing are carried on only to a limited extent. Forests and pasture-lands are numerous and extensive, and the timber and hay sent to the capital realise a considerable income. Quarries of the best stone for paving occur on the river Tosna, and near Stara-Russa there are mineral and saline springs.

**NOVGORO'D-SSJEWE'RSK**, or *Novgorod-Seversko'ie*, a town of Russia, in the province of Tchernigov, 59 miles north-east from Tchernigov, on the right bank of the Desna, a branch of the Dnieper. It is the capital of a district, and is a place of considerable trade and activity. Pop. (1867) 6301.

**NOVGRA'D-VOL'NSKI**, a town of European Russia, in the government of Volhynia, 53 miles west-north-west from Jitomir. It is the capital of a circle, and is situated on the banks of the Slutch, a feeder of the Pripiet, and so of the Dnieper. Pop. (1867) 8068.

**NO'VI**, a town of Northern Italy, in the province of Genoa, is a station on the railway from Turin to Genoa, and is 33 miles north-north-west of the latter city. It presents few attractions, with the exception of a number of picturesque old houses. It carries on a considerable transit-trade; and the silk produced in the vicinity is amongst the most celebrated in Italy. Pop. 11,445.

**NO'VIBAZA'R**, also *Jenibazar*, a town of Bosnia, European Turkey, situated on the river Raskika, an affluent of the Morava, 180 miles south-east of Bosna-Serai. Several of the great roads of the country cross each other here. N. has celebrated fairs, important trade, and considerable wealth, but the houses are mostly of mud. It is the chief point of communication between Bosnia and the rest of Turkey. Pop. estimated at 15,000.

**NOVITIATE**, the time of probation, as well as of preparatory training, which in all religious orders precedes the solemn *PROFESSION* (q. v.). Under the head of

**Novoarkhangelsk**  
Nubla

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**MONACHISM** will be found the general principles by which the training for the "religious" life is regulated. It will be enough to say here, that the novitiate in all orders must continue (Conc. Trid. Sess. xxv. c. 85, "De Regul. and Mon.") at least one year. In most orders it is of two, and in several of three. Any attempt to solemnise the profession before the expiration of the novitiate, without a dispensation, is invalid. During the novitiate, the novices are immediately subject to a superior, called Master (or Mistress) of Novices. They are not permitted to engage in systematic study, their whole time being devoted to prayer, and to ascetic and liturgical training. During the novitiate, the novice continues free to withdraw, nor is he or she admitted to profession at the close of the novitiate, except after proof given of fitness, and of proper dispositions for the particular institute aspired to.

**NOVOARKHANGIE'LSK** (New Archangel), or Sitka, a seaport of Alaska, formerly centre of the administration of the Russo-American Company, situated on the island of Sitka, on the n. w. coast of the American continent, in lat. 57° 3' n., long. about 135° w. It has a good port, and was the entrepôt of all the stores for the other Russo-American colonies, and of their produce, of which furs were the principal item. There are at N. only 66 clear days in the year. Mean temperature throughout the year, 43° 45' F. Pop. (before cession of Alaska to the U. S.) 1000, mostly servants of the company.

**NOVOMOSKO'VSK**, an important market-town of South Russia, in the government of Ekaterinoslav, and 20 miles north-north-east of the town of that name, on the Samara, an affluent of the Dnieper. Three extensive fairs, chiefly for the sale of cattle and horses, are held here annually. The "remounting" officers attend these fairs for the purpose of supplying their regiments with horses. Tanning and tallow-making are carried on. Pop. (1867) 10,379.

**NOVOTCHERKA'SK** a town of Southern Russia, capital of the territory of the Cossacks of the Don, on the Aksai, a tributary of the Don, at a distance of 12 miles from its right bank, and about 70 miles east-north-east of Taganrog. The central administration of the territory was transferred hither from Tcherkask in 1804 by Count Platoff, commander-in-chief of the Cossacks. The choice was not a happy one, the distance of the town from the Don, the great commercial artery, being much felt. In 1855, a statue was erected in memory of Count Platoff, who achieved an illustrious name by his military exploits from 1770 till 1816, and especially during the French invasion in 1812. Pop. (1867) 27,918, who carry on trade and manufactures, agriculture, cattle-breeding, fishing and wine-growing.

**NOWANAGA'R**, or Nowanuggur, a seaport of India, in the peninsula of Kattywar, Guzerat, at the mouth of the Nagna, a small river on the south shore of the Gulf of Cutch, 160 miles west-south-west from Ahmedabad, and in n. lat. 22° 38' c. long. 70° 11'. It is the principal place of the district of Hallar, the greater part of which is held as a *jaghire* by the chief of N., who bears the title of the Jam of Nowanagar. His territory comprises 540 villages, and a pop. of about 290,000. The town of N. is large and populous, nearly four miles in circuit. It is a place of very active trade, famous for the fine quality of the cloth which it produces, and for the brilliant colors of which its fabrics are dyed. In the adjacent sea are beds of pearl-oysters. Copper ore has been discovered in a range of hills behind the town.

**NOYADES** (i. e., "Drownings," from Fr. *noyer*, to drown), the execution of political offenders in great numbers at once by drowning them, one of the atrocities of the French Revolution, practised at Nantes by Carrier, the deputy of the Convention. See **CARRIER**. This mode of execution was also called, in cruel sport, *Vertical Deportation*.

**NOYAU**. See **LIQUEUR**.

**NOYON**, a town of France in the department of Oise, 78 miles north-north-east of Paris by the northern railway. It has a fine cathedral of the 12th and 13th centuries, in the Romanesque style of architecture; an episcopal palace, and some linen and cotton manufactures. Pop. (1876) 6785. N. was a residence of Charlemagne, and the place where Hugo Capet was crowned king of France in 987. It is also noted as the birthplace of John Calvin.

NUBIA, the modern appellation of a country subject to the Khedive of Egypt, extending from Philæ to the Sennar. lat.  $18^{\circ}$  s., bounded on the e. by the Arabian Gulf, n. by Egypt, s. by Abyssinia, and on the w. by the Desert. It appears to have been anciently known as Ethiopia. The ancients gave the name of Ethiopia to the west bank of the Nile from Meroë to the bend of the river. The name seems to have been derived from the Egyptian and Coptic *Noub*, or Gold, a name still retained in *Wady Nouba*, which extends from the frontier of Dongola, north of the *Wady Seboua*, above Derri. The tract between Seboua and Assouan is called the *Wady Kenous*. Diocletian removed hither a Libyan tribe, called Nobata, to the district above Syene, to oppose the Blemmyes, who inhabited the western desert, now held by the Ababde and Bisharein Arabs. The dominion of the Pharaohs, when most extended, reached to the Isle of Argos, the last place where the monuments of the Egyptians have been found. Under these monarchs it was called Cush, and was governed by a royal scribe, entitled Prince of Cush or Ethiopia, till the twentieth dynasty, when it appears to have been recovered by a series of native rulers, who ultimately conquered Egypt; and although driven back, finally extended their rule from Meroë to Syene, the most southern city held by the Egyptian monarchs, the Ptolemies, and the Romans. These Ethiopians adopted the civilisation of the Egyptians, and the names of some of their monarchs have been preserved. The subsequent fortunes of this country will be seen under ETHIOPIA. The modern inhabitants consist principally of Arabs, who invaded the country after the rise of Mohammed, the principal tribes being the Djowabere and El Gharbye, who inhabit from Assouan to the Wady Halfa; the Kenous, Djanfere, and others, a branch of the Koreish, who occupied the land from Esue to Assouan. By the aid of Bosnian soldiers, the Djowabere were driven into Dongola in the reign of Selim, and their descendants still flourish at Ibrim, Assouan, and Sal. Lower down, inhabit a race called the Berbers or Barabras; south of Coaseir are the Ababde. From Dongola and Sennar, a negro state, the people are called Noubas, a hardy race, differing from the pure blacks; but the country throughout is inhabited by mixed races of Arabian and Nigritic blood. Another tribe, the Sheygya, east of Dongola—a fine black race, addicted to horsemanship and war—are still more interesting. The Ababde Arabs are renowned as guides and camel drivers; the Bisharein are supposed by some to be the ancient Blemmyes, a tribe living on flesh and milk, but without the oriental jealousy of the Arabs; the Takas, supposed to be the ancient Bojaks, dwell in the mountains. Three principal languages are spoken by these various tribes—the Nuba by the Berbers, who entered from the south-west; the Kungara, a Nigritic dialect, by the negroes of Dafar; and the Bisharie, said to exhibit Aryan affinities. The inhabitants, estimated at about 1,000,000, although less in stature than the Egyptians, are a fine muscular race; the women are pleasing, but not beautiful; and the climate is remarkably healthy. In their political government they were governed by their own chiefs, *maks* or *malechs*, till they were subdued by Ismael Pasha, in 1820, to the sway of Egypt, and the civil government is now administered by the Turks. The country is arid, in many places only cultivable at the sides of the Nile, and consists of granite and sandstone. The soil raises durra, cotton, and date palms. It is traversed by the *Bahr el Azrek*, or Blue Nile, and the *Bahr el Abiad*, or White Nile. The products are numerous, comprising maize, dates, tamarinds, gums, aloes, civet, musk, wax, myrrh, frankincense, sena, black wool, hides both of the elephant and rhinoceros, and their ivory, ostrich feathers, ebony, gold dust, saltpetre, salt, tobacco, coffee, cotton, which are carried by way of commerce to Egypt. The taxes are rated by the number of water-wheels for the irrigation of the land. There being no native currency, the coins of Egypt and Europe, especially the Spanish dollar, are received, but glass-beads, coral, cloth, *tobs* or shirts, and cloth (*samoor*) also pass as money. In Kordofan, value is reckoned by cows. The most primitive modes of measurement are in use, maize being sold by the handful (*seiga*), 18 of which go to a *moud*; and cloth being measured from the elbow to the fingers. Polygamy is general, and a wife at Kenous is purchased of her parents for 30 piastres; amongst the Arabs for 6 camels, 8 of which are returned to the bridegroom. Some of the tribes are jealous of their women, who are celebrated by travellers on account of their virtue. In their costume, they use turbans, linen, and woollen garments, and are armed with lance and shield, the latter made of

the hide of the hippopotamus. No looms exist, but they plait neatly. Their chief musical instrument is a guitar of five strings, with sounding-board of a gazelle's hide. They are generally averse to commerce, eat little animal food, and are Mohammedans. Their houses are low huts of mud or stone. The chief attraction of this country to travellers is the numerous temples and other ancient remains of the Egyptians, extending from Philæ to the island of Argo. These consist of the temple of Isis, in the Isle of Philæ, founded by Nectanebo I., and continued by the Ptolemies; the temple of Deboud, built in honor of Amen Ra, by Ataramen, and continued by the Romans; Tafa or Taphis, the modern Kalabche, built by Rameses II.; the rock temple of Beit e Welly, recording the conquests of the same monarch; Wady Halfa, built by Osertesene I.; the rock temple of Ibeamboul, built by Rameses II.; Gebel Addeh, built by Horus of the eighteenth dynasty; Ibrim, built by Ammophes II.; Amada, founded by Thothmes III.; Ghersheh, Sebona, and Derri, built by Rameses II.; Dakkeh, the ancient Pselcis, built by Ergamenes; and the Colossus of the Isle of Argo; the Pyramids of Meroë and Tanquassi.—Burckhardt, "Travels;" Champollion le Jeune, "Lettres Ecrites," p. 107, and foll.; Lepsius, "Reise," p. 107, and foll.

**NUCLEOBANCHIA'TA**, or *Heteropoda*, an order of gasteropods having the sexes distinct; the locomotive organ fin-like, single, and ventral; the gills packed in small compass along with the heart. They are all marine, and usually swim with the back downwards and the fin-shaped foot upwards. They adhere to sea-weeds by a small sucker placed on the fin. Some of them, as *Atlanta*, have a shell large enough to protect the body; some, as *Carinaria*, have a small shell covering the gills and heart only; and some, as *Tritia*, have no shell at all.

**NU'CLEUS.** See **CELLS**.

**NUDIBRANCHIA'TA** (Naked-gills), an order of gasteropods, hermaphrodite, destitute of shell, and having the gills exposed on the surface of the body. The gills are differently situated in different genera. The genus *Doris* (q. v.) is an example of this order.

**NUE'CES**, a river of Texas, United States of America, rises in South-western Texas, lat. 30°, long. 101 w., and after a south-easterly course of 300 miles, flows into Corpus Christi Bay, and through the Pass of the same name into the Gulf of Mexico.

**NU'CHA**, or Nukha, a town of Russia; after Tiflis and Shemacha, the most important town of Transcaucasia, and the only town of the former khanat of N. or Sheki, in the north-west of Shirwan. It is 120 m. e. s. e. from Tiflis, and stands at the southern base of Caucasus in the valley of the Kish-Tshai, an affluent of the Alasan, which itself is a branch of the Kur. Pop. (1867) 23,371. The town is surrounded by mulberry groves and fruit-gardens, extending to a distance of several miles. It has long been famous for the rearing of silk-worms, silk-spinning, and the manufacture of silken goods.

**NUGGI'NA**, a town of British India, in the district of Bijpur, division of Rohilcund, North-west Provinces. It is 48 miles north-north-west from Moradabad, on the route from Moradabad to Hurdwar. N. is the Birmingham of Upper India, and is famous in modern times for the manufacture not only of gun-barrels but of percussion-lockets. Pop. (1872) 19,075.

**NUISANCE** is a legal term used to denote whatever is an annoyance to one's neighbors, or in a general sense to the public at large, in the exercise of their rights of property. The whole doctrine of nuisance is founded on the theory that every person is entitled to have the full use and enjoyment of his property, and of the right of passing to and fro on the highway without being interfered with or impeded by others, and whatever so impedes this full enjoyment of one's property and right of passage on the highway is a nuisance. Nuisances are thus capable of being divided into two kinds—private and public. Thus, if a neighbor leave a heap of rubbish emitting noxious smells close to A's windows, or make loud noises in his house, these may be said to be private nuisances, for they annoy A in the enjoyment of the fresh air and quiet which are part of his right of property. On the other hand, if something is put of the same kind on a public highway, or so as to annoy divers people equally and in the same manner, then it is called a public nuisance. One of the leading incidents of a nuisance is, that the party annoyed

by it can in many cases, especially where the nuisance is injurious to health, or life, take the law into his own hands and abate the nuisance without resorting to a court of law. The reason is, that the matter is of too urgent importance to await the slow progress of a suit at law, and mischief may be done in the meantime which would be often irreparable owing to the delay. Another important qualification of the right of abating a nuisance is, that the nuisance must be such that unless it is abated at once the party cannot exercise his legal rights; and hence if the nuisance is of such a kind that it does not directly interfere with the comfort or enjoyment of one's legal rights at the time, he has no right to abate it, but in that case is bound to resort to a court of law. This is best illustrated in the case of a nuisance on the highway, which is the class of cases in which the phrase a common nuisance is most familiarly known. Thus, if while A is riding or driving along the highway his progress is interrupted by a fence or gate which nobody has a legal right to put there, it is obvious that unless A can knock down or demolish at once this obstruction, he cannot proceed in the exercise of his legal right of using the highway. In such a case he has a right to demolish the gate and abate the nuisance, for it directly interferes with his own legal right. But if instead, a gate, a booth, or tent had been erected, not across the highway, but merely on one side of it, so as to leave room for passengers to pass, then though such tent or booth would be as undoubted a nuisance as in the other case, yet inasmuch as A can pass without direct interference, he has no right to abate the nuisance by destroying the tent. He must, in this latter case, resort to the legal remedy only. The same rule applies to all kinds of nuisances.

Another rule is, that in abating a nuisance the party is not to do unnecessary damage to property, i. e., more than simply abate the nuisance to such an extent as to enable himself to exercise his legal right, and no further. If he go beyond the immediate occasion, and cause unnecessary destruction to property, then he subjects himself to an action of damages. Hence it is often a difficult thing to know when one is justified in abating a nuisance and taking the law into his own hands.

Where the nuisance is sought to be removed by legal means, then the remedy is in some cases two-fold, and in some cases not so. Where the nuisance is of a private nature, an action of damages is in general the only remedy given by the common law. But where the nuisance is public, and affects all the public equally, or nearly so, then in general either an action may be brought, or an indictment will lie. Thus in case of a nuisance on a highway, as this affects all the lieges alike, an indictment is the proper remedy, though if an individual suffered special damage over and above what he suffers as one of the public, then he may bring an action. In Scotland, instead of an indictment, an action in the nature of a public action is raised, which is substantially similar in its results to an indictment.

As will be seen from what has preceded, the legal remedy in cases of nuisances has long been felt to be insufficient. To add to the other defects, there is great difficulty in determining whether a particular mode of using one's premises is in the nature of a nuisance or not; for if the line is drawn too narrowly, the rights of property and the natural freedom of the subject may be interfered with. On the other hand, things which formerly were considered no nuisances are now treated as such, owing to the spread of more enlightened views of public health and habits of cleanliness. These considerations recently induced the legislature to alter the common law in an important degree, and substitute a new code under the name of the Public Health and Nuisances Removal Acts, 11 and 12 Vict. c. 63; 18 and 19 Vict. c. 115; 35 and 36 Vict. c. 79. The general scheme of these acts is to enable districts to appoint local boards, with extensive powers of self-government, and to undertake and execute sanitary improvements, such as drainage and water supply on a large scale, paying for the expense thereof by a local rate or assessment.

As regards the power of removing nuisances, a statute was passed in 1855 for England, called the Nuisances Removal Act, which has been amended by two subsequent acts. By these acts, some sanitary authority, called rural or urban, under 35 and 36 Vict. c. 79, is appointed the local authority for carrying out the provisions of the act, and these are of an extensive kind. The act defines a nuisance to include any premises in such a state as to be a nuisance or injurious to health; any pool, ditch, gutter, water-course, privy, urinal, cess-pool, drain, or ashpit, so foul as to be

a nuisance or injurious to health; any animal so kept as to be a nuisance, or injurious to health; and any accumulation or deposit, overcrowding, foul condition, or smoke. The local authority is to appoint a sanitary inspector at a proper salary. Any person aggrieved may give notice to the local board, or the sanitary inspector may do so. The local board has extensive powers; it can authorise its inspector, on reasonable complaint, to demand an entrance into any private premises so as to inspect their condition, and may order the removal of nuisances found to exist there. The local board, on finding a nuisance exists, direct their officer to go before a justice of the peace and procure an order directing the private party to abate the nuisance. If he refuses to do so, the local board may remove the nuisance at the expense of the party on whose premises it exists, and sue him for such expenses. If any candle-house, melting-house, soap-house, slaughter-house, or place for boiling offal, blood, bones, &c., be certified by the medical officer, or any two medical practitioners, to be a nuisance, or injurious to the health of the inhabitants of the neighborhood, the local board may cause the person carrying on such trade to appear before a justice of the peace, and if it is not satisfactorily proved that he does not use the best practicable means for preventing or counteracting the effluvia, he is fined. So if houses are overcrowded, this may be stopped. Provisions are also enacted with a view to prevent the spread of diseases in times of epidemics, and to prevent common lodging-houses being kept in a foul state. Another important provision relates to the seizure of diseased meat and provisions exposed to sale, and the medical officer of health, or inspector of nuisances, has at all times power to inspect any animal, carcase, meat, poultry, game, flesh, fish, fruit, vegetables, corn, bread, or flour; and if found unfit for food, or diseased, or rancid, they may be carried away then and there and destroyed, and the shopkeeper fined. The local authority may also order owners of houses to supply proper water-closets, and to cleanse gutters and cess-pools which are foul. Besides the above provisions as to nuisances generally, there are separate statutes which prohibit smoke nuisance in the English metropolis and the river Thames. Thus all the furnaces in mills, factories, printing-houses, dye-houses, distilleries, glass-houses, bake-houses, &c., within the metropolis, must be so constructed as to consume their own smoke, and also any noxious or offensive effluvia arising from any trade is prohibited. These statutes are the 16 and 17 Vict. c. 128, and 19 and 20 Vict. c. 107.

In Scotland, a Nuisances Removal Statute was passed in 1856, and was re-enacted by the Public Health Act, 1867, 30 and 31 Vict. c. 101. By that act the town council, or police commissioners of the place, are constituted the local authority for enforcing the act, and in other places the parochial board. Besides dealing with the same class of nuisances as the English act, the Scotch act provided for checking all trades and businesses offensive and injurious to the health of the neighborhood. Similar powers were given to the local board to enter private houses and explore the causes of nuisances. Diseased and unwholesome meat and provisions may also be seized. Common lodging-houses were to be registered, and to be subject to rules and regulations to be made by the local authority. With regard to towns in Scotland, an extensive code of police laws was enacted in the General Police and Improvement Acts, 25 and 26 Vict. c. 101, 31 and 32 Vict. c. 102. The acts may be adopted by burghs; and villages above 700 of population may, by vote of householders, be converted into burghs for this purpose. A Smoke Nuisance Act for Scotland was passed applicable to all burghs, 20 and 21 Vict. c. 73; 24 Vict. c. 17; 26 and 27 Vict. c. 102.

The above is the usual legal acceptation of the term nuisance, but the word is sometimes used popularly to denote that class of nuisances, caused by disorderly houses or brothels, which are familiarly described as common nuisances. In the law of England those who keep a brothel are liable to be indicted for a misdemeanor, but as there was often a difficulty in settling the law in such cases, a statute of 25 Geo. II. c. 36, enacted that if any two inhabitants should give notice to a constable of such a house being kept, it should then be the duty of the constable under a penalty, to go with such inhabitants before a justice and engage to prosecute the keeper, and their expenses are paid by the parish out of the poor-rates. The same act provided that whoever in point of fact acted as the master or mistress of the house, should be taken to be the keeper of the house. The punishment is fine and imprisonment. Of late an attempt has been made to convict a landlord under this statute when he knows of the character of his tenants, and refuses to give

them notice to quit; but the courts have held that the mere fact of the landlord refusing to give notice to quit, and so to eject such tenants, was not enough to make him liable in any criminal punishment. In Scotland, the offence of keeping a brothel is punishable in a similar manner. But apart from the keeping of a brothel, there is no criminal offence committed in this country by those who frequent such houses for the purposes of prostitution unless where the circumstances amount to Rape (q. v.) or Abduction (q. v.), or an aggravated assault.

**NULLA BO'NA**, a legal phrase in England, descriptive of the return made to a sheriff, who in executing process against a debtor finds he has no goods.

**NULLIFICATION**, in American politics, the doctrine of the extreme states' rights party, of the right of a state to declare a law of Congress unconstitutional and void, and if the Federal government attempted to enforce it, to withdraw from the Union. In 1832, during the presidency of General Jackson, (q. v.), the free trade and states' rights party in South Carolina (q. v.), under the leadership of John C. Calhoun (q. v.), her senator in Congress, asserted the doctrine of Nullification in a state convention which declared the tariff acts of that year unconstitutional, and therefore null and void; that the duties should not be paid; and that any attempt on the part of the general government to enforce their payment, would cause the withdrawal of South Carolina from the Union, and the establishment of an independent government. President Jackson met this declaration with a vigorous proclamation, in which he declared that the laws must be executed, and that "the Union must and shall be preserved." South Carolina, standing alone, receded from her position under protest, and a "Compromise Bill," introduced by Henry Clay (q. v.) in 1833, providing for a gradual reduction of duties, for the time settled the controversy.

**NUMA POMPIILIUS**, in the mythic history of Rome, was the successor of Romulus, the founder of the city. He was a native of Cures in the Sabine country, and was universally revered for his wisdom and piety. Unanimously elected king by the Roman people, he soon justified by his conduct the wisdom of their choice. After dividing the lands which Romulus had conquered, he proceeded, with the assistance of the sacred nymph Egeria, to draw up religious institutions for his subjects, and thus stands out in the primitive legend as the author of the Roman ceremonial law. His reign lasted for 39 years, and was a golden age of peace and happiness. The only feature in the myth of N. P. which we can regard as probably historical, is that which indicates the infusion of a Sabine religious element into Roman history at some remote period.

**NUMA'NTIA**, the chief town of the Celtiberian people called Arevaci in ancient Spain, was situated on the Douro (Durius), in the neighborhood of the present Soria in Old Castile. The site is probably marked by the present Puente de Guarray. N. is celebrated for the heroic resistance which it made to the Romans, from 153 B.C., when its citizens first met a Roman army in battle, to 134 B.C., when it was taken and destroyed by Scipio the younger, after a siege of 15 months, in the course of which famine and the sword had left alive very few of its 8000 brave defenders. The besieging force under Scipio amounted to 60,000.

**NUMBERS**, Theory of, the most subtle and intricate, and at the same time one of the most extensive, branches of mathematical analysis. It treats primarily of the forms of numbers, and of the properties at once deducible from these forms; but its principal field is the theory of equations, in as far as equations are soluble in whole numbers or rational fractions, and more particularly that branch known as Indeterminate Equations. Closely allied to this branch are those problems which are usually grouped under the Diophantine Analysis (q. v.), a class of problems alike interesting and difficult; and of which the following are examples: 1. Find the numbers the sum of whose squares shall be a square number; a condition satisfied by 5 and 12, 8 and 15, 9 and 40, &c. 2. Find three square numbers in arithmetical progression; Answer, 1, 25, and 49; 4, 100, 196, &c.

*Forms of Numbers* are certain algebraic formulas, which, by assigning to the letters successive numerical values from 0 upwards, are capable of producing all numbers without exception, e. g., by giving to  $m$  the successive values 0, 1, 2, 3, &c., in any of the following groups of formulas:  $2m, 2m + 1; 3m, 3m + 1, 3m + 2; 4m, 4m + 1, 4m + 2, 4m + 3$ , we can produce the natural series of numbers. These formulas are



based on the self-evident principle, that the remainder after division is less than the divisor, and that, consequently, every number can be represented in the form of the product of two factors + a number less than the smaller factor.

By means of these formulas, many properties of numbers can be demonstrated without difficulty. To give a few examples. (1.) *The product of two consecutive numbers is divisible by 2*: Let  $2m$  be one number, then the other is either  $2m + 1$  or  $2m - 1$ , and the product  $2m(2m \pm 1)$  contains 2 as a factor, and is thus divisible by 2. *The product of three consecutive numbers is divisible by 6*: Let  $3m$  be one of the numbers (as in every triad of consecutive numbers one must be a multiple of 3), then the others are either  $3m - 2$ ,  $3m - 1$ ;  $3m - 1$ ,  $3m + 1$ ; or  $3m + 1$ ,  $3m + 2$ . In the first and third cases, the proposition is manifest, as  $(3m - 2)(3m - 1)$ , and  $(3m + 1)(3m + 2)$ , are each divisible by 2, and therefore their product into  $3m$  is divisible by 6 ( $= 1.2.3$ ). In the second case the product is  $3m(3m - 1)(3m + 1)$ , or  $3m(9m^2 - 1)$ , where 3 is a factor, and it is necessary to shew that  $m(9m^2 - 1)$  is divisible by 2; if  $m$  be even, the thing is proved; but if odd, then  $m^2$  is odd,  $9m^2$  is odd, and  $9m^2 - 1$  is even; hence, in this case also the proposition is true. It can similarly be proved that the product of four consecutive numbers is divisible by 24 ( $= 1.2.3.4$ ), of 5 consecutive numbers by 120 ( $= 1.2.3.4.5$ ), and so on generally. These propositions form the basis for proof of many properties of numbers, such as that the difference of the squares of any two odd numbers is divisible by 8. The difference between a number and its cube is the product of three consecutive numbers, and is consequently (see above) always divisible by 6. Any prime number, which, when divided by 4, leaves a remainder unity, is the sum of two square numbers: thus,  $41 = 25 + 16 = 5^2 + 4^2$ ,  $233 = 169 + 64 = 13^2 + 8^2$ , &c.

Besides these, there are a great many interesting properties of numbers which defy classification; such as, that the sum of the odd numbers beginning with unity is a square number (the square of the number of terms added), i. e.,  $1 + 3 + 5 = 9 = 3^2$ ,  $1 + 3 + 5 + 7 + 9 = 25 = 5^2$ , &c.; and, the sum of the cubes of the natural numbers is the square of the sum of the numbers, i. e.,  $1^3 + 2^3 + 3^3 = 1 + 8 + 27 = 36 = (1 + 2 + 3)^2$ ,  $1^3 + 2^3 + 3^3 + 4^3 = 100 = (1 + 2 + 3 + 4)^2$ , &c.

We shall close this article with a few general remarks on numbers themselves. Numbers are divided into *prime* and *composite*—prime numbers being those which contain no factor greater than unity; composite numbers, those which are the product of two (not reckoning unity) or more factors. The number of primes is unlimited, and so consequently are the others. The product of any number of consecutive numbers is even, as also are the squares of all even numbers; while the product of two odd numbers, or the squares of odd numbers, are odd. Every composite number can be put under the form of a product of powers of numbers; thus,  $144 = 2^4 + 3^2$ , or generally,  $n = a^p \cdot b^q \cdot c^r$ , where  $a$ ,  $b$ , and  $c$  are prime numbers, and the number of the divisors of such a composite number is equal to the product  $(p + 1)(q + 1)(r + 1)$ , unity and the number itself being included. In the case of 144, the number of divisors would be  $(4 + 1)(2 + 1)$ , or  $5 \times 3$ , or 15, which we find by trial to be the case. *Perfect numbers* are those which are equal to the sum of their divisors (the number itself being of course excepted); thus,  $6 = 1 + 2 + 3$ ,  $28 = 1 + 2 + 4 + 7 + 14$ , and 496, are perfect numbers. *Amicable numbers* are pairs of numbers, either one of the pair being equal to the sum of the divisors of the other; thus, 220 ( $= 1 + 2 + 4 + 5 + 10 + 11 + 20 + 22 + 44 + 55 + 110 = 284$ ), and 284 ( $= 1 + 2 + 4 + 71 + 142 = 220$ ), are amicable numbers. For other series of numbers, see FIGURATE NUMBERS.

The most ancient writer on the theory of numbers was Diophantus, who flourished in the 3d c., and the subject received no further development till the time of Vieta and Fermat (the latter being the author of several celebrated theorems, a discussion of which, however, is quite unsuited to this work), who greatly extended it. Euler next added his quota, and was followed by Lagrange, Legendre, and Gauss, who in turn successfully applied themselves to the study of numbers, and brought the theory to its present state. Cauchy, Libri and Gill (in America) have also devoted themselves to it with success. The chief authorities down to the present century are Barlow's "Theory of Numbers" (1811), Legendre's "Essai sur la Théorie des Nombres" (third ed. Paris, 1830), and Gauss's "Disquisitiones Arith-

metic" (Brunswick, 1801; Fr. translation, 1807); and for the latest discoveries, the transactions of the various learned societies may be consulted.

**NUMBERS (LXX. *Arithmoi*; Heb. *Bamidbar*)**, the fourth book of the Pentateuch, consists of 36 chapters, embracing the history of the march of the Israelites through the Desert, together with the special laws given during this period as complementary to the Sinaitic legislation. Beginning with the census of the people (whence the name of the book), and the assigning of the special places to each tribe with reference to the sanctuary, the whole people is classified, and the tribe of Levi specially singled out. Ordinances on the purity to be maintained in the camp, the functions of the priests, and a description of the passover, follow. The second portion of the book describes the journey from Sinai to the borders of Canaan, the miraculous sustenance of the people, their dissatisfaction and consequent rejection, together with various special laws respecting sacrifices, &c., and the episode of Korah. The third part embraces the first ten months of the fortieth year of the wandering—an epoch hurried over with remarkable swiftness by the historian. In quick succession, the renewed strife of the people with their leaders, the message to the king of Moab, the death of Aaron, the defeat of the king of Arad, the punishment of the people by serpents, the march from Hor to Pisga, and the victorious battle against the kings of Sihon and Og, are recounted, and the extraordinary episode of Balaam follows. The further wiles employed by the alarmed Moabites and Midianites to avert the threatening invasion, and their result, together with the second census, are narrated. Moses is warned of his death, and the vital question of his succession is settled. Further laws and ordinances respecting sacrifices and vows, the conquest of the Midianites, and the partition of the country east of the Jordan among certain tribes, a recapitulation of the encampments in the Desert, a detailed specification of the manner in which the promised land should be divided after its conquest, and the final ordinance of the marriages of heiresses among their own tribe only, so as to preserve the integrity of lauded property, make up the remainder of the book.

The Book of Numbers is, like the rest of the Pentateuch, supposed by the greater part of modern critics to consist of several documents written by *Elohist*s and *Jehovists* respectively. See **GENESIS**, **PENTATEUCH**.

**NUMERALS**, the general name given to figures or symbols by means of which numbers are expressed (for Roman and Greek numerals, see **NOTATION**); the distinctive name of *Arabic Numerals* being given to the nine figures or digits and the zero, that are now in almost universal use among civilised nations for this purpose. Both the origin of these figures, and the period at which they became known in Europe, have been made subjects of laborious investigation; and it seems to be now proved beyond a doubt that they are of Indian not Arabic origin, and were invented by the Brahmins some time B.C. But the more important inquiry as to the time of their introduction into Europe has hitherto baffled all research. The simple and convenient theory, that they were introduced into Spain by the conquering Arabs, and from that country, then a great seat of learning, a knowledge of them was disseminated throughout Europe, is contradicted by the fact that the eastern Arabs themselves had no knowledge of them previous to the time of the Calif Al-Mamun (813—833), while a knowledge of them existed in Europe from a considerably earlier date. The most probable theory is that they were brought from India, probably by the Neo-Pythagoreans, and introduced into Italy, whence they became known to a few of the learned men of Eastern Europe. We have, however, every reason to suppose that the figures then known were totally different in form from those now used. These latter, called *Gobar* by the Arabs, may have been brought to Bagdad during the reign of Al-Mansur (760), or his immediate successors, and certainly not later than the time of Al-Mamun. During the latter reign we know the present system of arithmetic was introduced into Persia from India, and most probably a knowledge of the Gobar figures at the same time. Thence the system of arithmetic was brought to north-western Africa and Spain, and doubtless the figures along with it, about the end of the 10th or beginning of the 11th century, and from Spain a knowledge of both was speedily communicated to the rest of Europe, the Gobar figures superseding those forms of Eastern figures which had previously been employed. The knowledge of the figures however

spread, as was natural, much more rapidly than the notation and arithmetic of which they were the foundation, and we consequently find in writings and inscriptions of the middle ages the Gobar figures partly substituted for, and mixed up with, the Roman numerals; as, for instance, XXX2, for 32; X4, for 14, &c.; and occasionally such expressions as 302, 303, for 32 and 33. The earliest work on modern arithmetic was published in Germany in 1390; it explained the decimal notation, and exemplified the elementary rules. The Arabic numerals were not generally introduced into England till the commencement of the 17th c., and it was long after that time before the decimal arithmetic became general. See a dissertation "Sur les Chiffres Indiens," by M. Woepke, in the Asiatic journal.

NUMERATION, the reading off of numbers that are expressed by figures. As shewn in Notation (q. v.), the first figure on the right hand expresses units; the next, tens; the third, hundreds; and following the same nomenclature with the next three figures, we have the fourth expressing units of thousands; the fifth, tens of thousands; the sixth, hundreds of thousands. The seventh figure, in like manner, expresses units of millions; the eighth, tens of millions; and the ninth, hundreds of millions. When this method is consistently followed out, as is the case with French and other continental arithmeticians, the fourth period, or group of three figures, is denominated billions, the first figure of it (the tenth from the extreme right) being units of billions; the next, tens of billions; &c. Read in this way, the figures 56,684,763,204,504 express fifty-six trillions, eighty-four billions, seven-hundred-and-sixty-three millions, two-hundred-and-four thousands, five-hundred-and-four units. In Britain, there is a slight variation in the mode, the only effect of which is to render it a little more complicated: thus, after units of millions, come tens and hundreds of millions, but then instead of billions we have, according to the current usage, thousands of millions; after this, tens of thousands of millions and hundreds of thousands of millions, and then billions, which occupy the 12th figure from the right, and are reckoned in the same way as millions, so that the next unit or *trillions* does not come in till the 19th figure. The above number, according to the British mode, would be read fifty-six billions, eighty-four thousand-seven-hundred-and-sixty-three millions, two hundred-and-four thousands, five-hundred-and-four units. The first method is perfectly symmetrical, keeping throughout to divisions of three figures; the second only keeps to this division up to hundreds of millions, when it changes it for a division into parcels of six figures, which are named from units up to hundreds of thousands of units. The latter mode is, however, gradually falling into disuse.

NUMIDIA (Gr. *Nomadia*, the land of Nomads), the name given by the Romans to a part of the north coast of Africa, corresponding to some extent with the modern Algiers. It was bounded on the w. by the river Mulucha (now *Moluya*), which separated it from Mauritania; on the e. by the river Tusca (now *Wadi-el-Irber*), which separated it from the territory of Carthage, the *Africa Propria* of the Romans; on the south, it reached to the chains of Mount Atlas and the Lacus Tritonis, which separated it from the land of the Gaetulians and Interior Libya. The chief rivers were the Rubricatus and the Ampsaga. The inhabitants of N., as of Mauritania, belonged to the race from which the modern Berber are descended. They were a warlike race, and excelled as horsemen; but, like most barbarians, were faithless and unscrupulous. Of their tribes, the *Massyli* in the east, and the *Masæsyli* in the west, were the most powerful. In the grand struggle between the Carthaginians and the Romans, they at first fought on the side of the former, but subsequently the king of the Eastern Numidians, Massinissa, joined the Romans, and rendered them eternal service in the war with Hannibal. Favored by the conquerors, he united all N. under his sway. Of his successors in this kingdom, Jugurtha and Juba are the most famous. After the victory of Cæsar over Juba I., in the African war, N. became a Roman province (46 B.C.); but Augustus afterwards gave the western part—from the river Ampsaga, now Wadi-el-Kibbir—with Mauritania, to Juba N., and the name N. became limited to the eastern part; and when Mauritania became a Roman province, the western part was called Mauritania Cæsariensis. Among the Roman colonies were Hippo Regius, near the mouth of the river Rubricatus; Cirta (the residence of the Numidian kings), afterwards called Constantina, a name still preserved in Constantine; Sicca, and Rusicada. For the modern history of N. see **ALGIER**.

**NUMISMATICS** (Lat. *nummus* and *numisma*, money; Gr. *nomisma*, from *nomos*, law, a medium of exchange established by law), the science which treats of coins and medals. A coin is a piece of metal of a fixed weight stamped by authority of government, and employed as a circulating medium. A medal is a piece struck to commemorate an event. The study of numismatics has an important bearing on history. Coins have been the means of ascertaining the names of forgotten countries and cities, their position, their chronology, the succession of their kings, their usages, civil, military, and religious, and the style of their art. On their respective coins we can look on undoubtedly accurate representations of Mithridates, Julius Cæsar, Augustus, Nero, Caracalla, and read their character and features.

The metals, which have generally been used for coinage are gold, silver, and copper. In each class is comprised the alloy occasionally substituted for it, as electrum (an alloy of gold and silver) for gold, billon for silver, bronze for copper, and potin (an alloy softer than billon) for silver and copper. The side of a coin which bears the most important device or inscription is called the *obverse*, the other side the *reverse*. The words or letters on a coin are called its inscription; an inscription surrounding the border is called the *legend*. When the lower part of the reverse is distinctly separated from the main device, it is called the *exergue* (Gr. *ex ergou*, without the work), and often bears a secondary inscription, with the date or place of mintage. The field is the space on the surface of the coin unoccupied by the principal device or inscription.

The use of coined money cannot be traced further back than the 9th c. B.C. Money, however, as a medium of exchange, existed much earlier, and when of metal it passed by weight, no piece being adjusted to any precise weight, and all money being weighed when exchanged. Early metallic money was in the form of bars, spikes, and rings; the ring money could be opened, closed and linked in a chain for convenience of carriage.

The Lydians are supposed to have been the first people who used coined money, about 700 or 800 years before the Christian era; and their example was soon after followed by the different states of Greece, the earliest Greek coins being those of Ægina. In its early stages the process of coining consisted in placing a lump of metal of a fixed weight, and approaching to a globular form, over a die, on which was engraved the religious or national symbol to be impressed. A wedge or punch placed at the back of the metal was held steadily with one hand, and struck by a hammer with the other, till the metal was sufficiently fixed in the die to receive a good impression. The impression was a guarantee of the weight of the piece. From the nature of the process, the earliest coins had a lumpish appearance, and on their reverse was a rough, irregular, hollow square, corresponding to a similar square on the punch, devised for the purpose of keeping the coin steady when struck by the coining hammer. The original coins of Asia Minor were of gold, those of Greece of silver. The earliest coins bear emblems of a sacred character, often embodying some legend regarding the foundation of the state, as the *phoca* or seal on the coins of the Phocians, which alludes to the shoal of seals said to have followed the fleet during the emigration of the people. There is a very early double stater of Miletus, in Ionia, of which the type is the lion's head, derived from Persia and Assyria, and associated with the worship of Cybele, a symbol which is continued in the later coinage of Miletus. Types of this kind were succeeded by portraits of protecting deities. The earliest coins of Athens have the owl, as type of the goddess Athene; at a later period, the head of the goddess herself takes its place, the owl afterwards re-appearing on the reverse. The punch-mark, at first a rudely-roughed square, soon assumed the more slightly form of deep, wedge-like indents, which in later specimens become more regular, till they form themselves into a tolerably symmetrical square. In the next stage, the indents become shallower, and consist of four squares forming one large one. The surrounding of the punch-mark with a band bearing a name, and the introduction of a head in its centre, gradually led to the perfect reverse. There is a remarkable series of so-called "encased" coins struck in Magna Græcia, of which the reverse is an exact repetition in concave of the relief of the obverse. These coins are thin, flat, sharp in relief, and beautifully executed.

The leading coin of Greece and the Greek colonies was the stater, so called because founded on a standard of weight generally received before the introduction of

coined money. There were double staters, and half, third, and quarter staters, and the stater was equivalent in value to six of the silver pieces called drachmæ. The obolus was one-sixth of the drachma, at first struck in silver, in later times in copper.

The inscriptions on the earliest Greek coins consist of a single letter, the initial of the city where they were struck. The remaining letters, or a portion of them, were afterwards added, the name, when in full, being in the genitive case. Monograms sometimes occur in addition to the name, or part name, of the place. The first coin bearing the name of a king is the tetradrachm (or piece of four drachmæ) of Alexander I. of Macedon.

Among the early coins of Asia, one of the most celebrated is the stater Darius or Darius, named from Darius Hystaspes. It had for symbol an archer kneeling on one knee, and seems to have been coined for the Greek colonies of Asia by their Persian conquerors. In the reign of Philip of Macedon, the coinage of Greece had attained its full development, having a perfect reverse. One of the earliest specimens of the complete coin is a beautiful medal struck at Syracuse, with the head of Proserpine accompanied by dolphins, and for reverse a victor in the Olympic games in a chariot receiving a wreath from Victory—a type which is also found on the reverse of the staters of Philip of Macedon, known as Philippe, and largely imitated by other states. Coins of Alexander the Great are abundant, many having been struck after his conquests in the Greek towns of Asia. A rose distinguishes those struck at Rhodes, a bee those struck at Ephesus, &c.; these are all types generally accompanying the figure of Zeus on the reverse; on the obverse is the head of Hercules, which has sometimes been supposed to be that of Alexander himself. It would rather seem, however, that the conqueror's immediate successors were the first who placed their portrait on the coin, and that under a shallow pretence of deification, Lysimachus as a descendant of Bacchus, and Seleucus of Apollo, clothed in the attributes of these deities. Two most beautiful and important series of Greek coins are those of the Seleucidæ, in Asia, of silver, and of the Lagidæ or Ptolemies, in Egypt, of gold.

In Palestine there is an interesting series of coins founded on the religious history of the Jewish nation, and assigned to Simon Maccabæus. They are shekels and half-shekels, equivalent to two Attic drachmæ and one drachma respectively. The shekels bear on the obverse the pot of manna, with the inscription "Schekei Israel" (the Shekel of Israel); on the reverse is Aaron's rod with three flowers, and the legend "Ierouschalim kedoschah" (Jerusalem the Holy). The inscriptions are in the Samaritan character. The successors of Simon assumed the title of king, and placed their portraits on the coins, with inscriptions in Greek as well as in Hebrew.

Roman coins belong to three different series, known as the Republican, the Family, and the Imperial.

The so-called Republican, the earliest coinage, began at an early period of Roman history, and subsisted till about 80 B.C. Its standard metal was copper, or rather *æs* or bronze, an alloy of copper. The standard unit was the poundweight divided into twelve ounces. The *æs* or *as*, or pound of bronze, is said to have received a state impress as early as the reign of Servius Tullius, 578 B.C. This gigantic piece was oblong like a brick, and stamped with the representation of an ox or sheep, whence the word *pecunia*, from *pecus*, cattle. The full pound of the *as* was gradually reduced, always retaining the twelve (nominally) uncial subdivisions, till its actual weight came to be no more than a quarter of an ounce. About the time when the *as* had diminished to nine ounces, the square form was exchanged for the circular. This large copper coin, called the "*as grave*," was not struck with the punch, but cast, and exhibited on the obverse the *Janus bifrons*; and on the reverse, the prow of a ship, with the numeral I. Of the fractions of the *as*, the sextans, or sixth part, generally bears the head of Mercury, and the uncia, or ounce piece, that of Minerva; these pieces being further distinguished by dots or knobs, one for each ounce. There were circular pieces as high as the decussis, or piece of twelve *asses*, presenting a head of Roma (or Minerva), but none are known to have been coined till the weight of the *as* had diminished to four ounces. The Roman uncial coinage extended to the other states of Italy, where a variety of types were introduced, including mythological heads and animals. In the reign of Augustus, the *as* was virtually superseded by the *aestertius*, called by numismatists the

first bronze, about the size of our penny, which was at first of the value of  $\frac{3}{4}$ , afterwards of 4 asses. The sestertius derived its value from the silver denarius, of which it was the fourth. The half of the sestertius was the dupondius (known as the second bronze), and the half of the dupondius was called the assarium, an old name of the as. The assarium is known to numismatists as the third bronze.

Silver was first coined at Rome about 281 B.C., the standard being founded on the Greek drachma, then equivalent in value to ten asses; the new coin was therefore called a denarius, or piece of ten asses. The earliest silver coined at Rome has on the obverse the head of Roma (differing from Minerva by having wings attached to the helmet); on the reverse is a quadriga or biga, or the Dioscuri. Among various other types which occur in the silver of the Italian towns subject to Rome are the horse's head and galloping horse, both very beautiful. During the social war, the revolted states coined money independently of Rome, and used various devices to distinguish it as Italian and not Roman money.

The earliest gold coins seem to have been issued about 90 B.C., and consisted of the scrupulum, equivalent to 20 sestertii, and the double and treble scrupulum. These pieces bear the head of Mars on the obverse, and on the reverse an eagle standing on a thunderbolt, with the inscription "Roma" on the exergue. The large early republican coins were cast, not struck.

The Family Coins begin about 170 B.C., and about 80 B.C. they entirely superseded the coins first described. Those families who successively held offices connected with the public mint acquired the right first to inscribe their names on the money, afterwards to introduce symbols of events in their own family history. These types gradually superseded the natural ones; the portrait of an ancestor followed; and then the portrait of a living citizen, Julius Cæsar.

Under the empire, the copper sestertius, which had displaced the as, continued the monetary standard. A magnificent series exists of the first bronzes of the emperors from Augustus to Gallienus. While it was the privilege of the emperors to coin gold and silver, copper could only be coined *ex aenatus consulto*, which from the time of Augustus was expressed on the coins by the letters S.C., or EX S.C. The obverse of the imperial coins bears the portraits of the successive emperors, sometimes of the empress or other members of the imperial family; and the reverse represents some event, military or social, of the emperor's reign, sometimes allegorised. The emperor's name and title are inscribed on the obverse, and sometimes partly continued on the reverse; the inscription on the reverse generally relates to the subject delineated; and towards the close of the 3d c., the exergue of the reverse is occupied by the name of the town where the coin is struck. The coins of Augustus and those of Livia, Antonia, and Agrippina the Elder have much artistic merit. The workmanship of Nero's sestertii is very beautiful. The coins of Vespasian and Titus commemorate the conquest of Judæa. The Colosseum appears on a sestertius of Vespasian. The coins of Trajan are noted for their architectural types. Hadrian's coins commemorate his journeys. The coins and medals of Antonine, Marcus Aurelius, and the two Faustine are well executed; as are also those of Commodus, of whom a remarkable medallion relates to the conquest of Britain. There is a rapid falling off in design after the time of Commodus, and base silver comes extensively into use in the reign of Caracalla. Gallienus introduced the practice of coining money of copper washed with silver.

The colonial and provincial money of this period was very inferior to that coined in Rome. In the coins of the provinces which had been formed out of the Greek empire, the obverse bears the emperor's head, and the reverse generally the chief temple of the gods in the city of coinage; the inscriptions are in Greek. In the imperial coins of Alexandria appear such characteristic devices as the heads of Jupiter Ammon, Isis, and Canopus, the sphinx, the serpent, the lotus, and the wheat-ear. Colonial coins were at first distinguished by a team of oxen, afterwards by banners, the number of which indicated the number of legions from which the colony had been drawn.

After the time of Gallienus, the colonial money and the Greek imperial money, except that of Alexandria, ceased, and much of the Roman coinage was executed in the provinces, the name of the town of issue appearing on the exergue. Diocletian introduced a new piece of money, called the follis, which became the chief coin of the lower empire. The first bronze has disappeared after Gallienus, and the second

disappears after Diocletian, the third bronze diminishing to 1-20th of an ounce. With the establishment of Christianity under Constantine, a few Christian types are introduced. The third bronze of that emperor has the *Labarum* (q. v.), with the monogram IHS. Large medallions, called *contorniatæ*, encircled with a deep groove, belong to this period, and seem to have been prizes for distribution at the public games. Pagau types recur on the coins of Julian; and after his time the third bronze disappears.

The money of the Byzantine empire forms a link between the subject of ancient and that of modern coins. The portrait of the emperor on the obverse is after the 10th c. supported by some protecting saint. The reverse has at first such types as Victory with a cross, afterwards a representation of the Saviour or the Virgin; in some instances, the Virgin supporting the walls of Constantinople. Latin is gradually superseded by Greek in the inscriptions, and wholly disappears by the time of Alexius I. The chief gold piece was the *solidus* or *nomisma*, which was long famed in commerce for its purity, and circulated largely in the west as well as the east of Europe.

Of the coins of the middle ages, the most important is the silver denier or penny, derived from the Latin *denarius*. Its half was the *obole*, first of silver, afterwards of billon. Coins of this description were issued in the German empire, France, England, and the Scandinavian states, and in many cases by ecclesiastical princes and fief lords as well as sovereigns. The obverse of the regal coin of the early middle ages is generally the bust of the sovereign, and the reverse a Greek cross, accompanied by the royal name or title, and the place of mintage or the moneyer (see *MINT*). The arms of the country were introduced in the 12th c., in conjunction with the cross, and afterwards superseded it. In the 13th and 14th centuries, coins began to be issued by free imperial cities or corporations of towns; and these prevailed extensively throughout Germany and other parts of Europe a thin piece called a *bracteate*, in relief on one side, and hollow on the other, often not bearing a single letter, and rarely a full inscription. Down to the 14th c., the relief of the mediæval coins is very inconsiderable, the pieces thin, and the art poor.

Britain received the Roman money on its subjugation. Constantine seems to have had a mint in London, and the Roman currency continued to circulate for a time after the departure of the conquerors. The first independent coinage, however, shews hardly a trace of the influence of Rome; it consists of two small coins, called the *skeatta* and *styca*, the former of silver, the latter of copper. Both seem to belong solely to the Saxon kingdom of Northumbria; they are without inscriptions; a bird, a rude profile, and several unintelligible symbols appear on them, and their art is of the most debased kind. In the other kingdoms of the heptarchy silver pennies were coined, first intended to be 1-240th of a pound weight; on the disappearance of *skeattæ* and *stycæ*, they form, with the occasional addition of halfpennies, the sole currency of England down to the reign of Edward III. The pennies of the heptarchy bear the name of the king or of the moneyer; a cross sometimes appears after the introduction of Christianity, and in later times a rude head of the king or queen. The pennies of the Saxon and Danish sole monarchs of England, have a somewhat similar character. Alfred's earlier coins have a grotesque-looking portrait, and on the reverse a monogram of London; in his later coins the head disappears, and a cross and circle take its place. A cross, variously ornamented with three pellets in each angle, continues to be the usual reverse of the Saxon, Norman, and Plantagenet coins. The coins of Edward III. are a great artistic advance on those that preceded them. The silver coinage of that king consisted not only of pennies, halfpennies, and farthings, but also of groats and half-groats. The obverse of the groat bears a conventional crowned head within a flowered circle of nine arches, the words "*Dei Gratia*" and the title "*Rex Francie*" appearing for the first time in the legend. The reverse has the motto "*Posui Deum adiutorem meum*," which continued on the coinage till the time of Edward V. But the great numismatic feature of Edward III.'s reign is the issue of gold nobles, worth six shillings and eightpence. The obverse of those beautiful coins represent the king in a ship, a sword in his right hand, in his left a shield with the quartered arms of France and England. The reverse is a rich cross *florey* within a circle of eight arches, and a lion under a crown in each angle of the cross, the legend being "*Ihesus autem transiens per medium illorum ibat*." Half and quarter nobles were also coined. The noble having increased in value, a coin

called an angel, of the former value of a noble, was issued by Henry VI. and Edward IV. The obverse represented St Michael transfixing a dragon; the reverse a ship, with a cross for the mast.

As we approach the period of the Reformation, the coinage gradually becomes more ornate. The nobles coined by Edward IV., after the value of that coin had been fixed at ten shillings, were called rials (a name derived from a French coin), and the double rial or sovereign was first coined by Henry VII. The obverse has the king on his throne with sceptre and orb, and on the reverse, in the centre of a heraldic full-blown rose, is a shield with the arms of France and England. The testoon, or shilling, valued at twelve pence, also first appeared in this reign, with the royal profile crowned on the obverse, and the royal arms quartered by the cross on the reverse. A great debasement of the coinage took place in the reign of Henry VIII. The reverse of the farthings of that monarch bears a portcullis, that of the shillings a rose surmounted by a crown, and of the sovereigns, the royal arms supported by a lion and dragon. A noble was coined with St George and the dragon on the obverse, and on the reverse a ship with three crosses for masts, and a rose on the centre mast. On the coins of Henry VIII. the title "*Hiberniæ Rex*" first appeared, former kings having only styled themselves "*Domini Hiberniæ*." Ireland not being accounted a kingdom. Under Edward VI., the silver coins called crowns and half-crowns appear, having for device the king crowned on horseback in the armor of the period. They derived their name from coins circulating on the continent, which had for device a crown. The royal arms in an oval shield without the cross are introduced as the reverse of the shilling. From this period there is a very obvious decline in the artistic feeling of the English coins. On some of the shillings of Mary, her bust and that of Philip face each other, the insignia of Spain and England imperially occupying the reverse; afterwards the king's head occupies one side of the coin, and the queen's the other. Half-sovereigns, or rials, and angels were coined of the old type of Edward IV. The great event in the coinage of Elizabeth's reign was the temporary introduction of the mill and screw, instead of the hammer and punch, producing coins of a more regular and workmanlike appearance. The profile bust of James I., crowned and in armor, appears on his shillings and smaller pieces; on his crowns and half-crowns he is represented on horseback; on the reverse are the quartered arms of the three kingdoms (the harp of Ireland appearing for the first time on the coinage), with the motto "*Que Deus coniunxit nemo separat.*" Copper farthings, with crown, sceptre, and sword on the obverse, and a harp on the reverse, were coined for England as well as Ireland, the first copper money issued in England since the stycas. Private tokens of copper, issued by tradesmen and others, had, however, been in circulation before, and came again into use to a large extent at a later period. Charles I. coined ten and twenty shilling pieces of silver, the former a very noble coin, with a representation of the king on horseback. A crown, struck at Oxford, bears on the obverse the king on horseback, with a representation of the town, and on the reverse the heads of the Oxford declaration. The guinea, first coined in this reign, was so called from the metal being procured from the coast of Guinea; its original value was but twenty shillings.

The coins of the Commonwealth exhibit a shield with the cross of St George surrounded by a palm and olive branch, and have for legend "*The Commonwealth of England.*" On the reverse are two shields accolée, with the cross of St George and the harp of Ireland, and the motto "*God with us.*" Coins far superior in character were executed by Cromwell, with his laureated bust and title as Protector, and on the reverse a crowned shield quartering the cross of St George, of St Andrew and the harp, with the Protector's paternal arms in surcoat; but few of these were issued. In the early coins of Charles II., that monarch is crowned, and in the dress of the time; in his later money he is in conventionalised Roman drapery, with the head turned to the left, and from that time it has been the practice to turn every king's head the reverse way from that of his predecessor. The four shields on the reverse are disposed in the form of a cross (an arrangement which continued till the reign of George II.), and on the edge of the crowns and half-crowns is the legend "*Decus et tutamen.*" Charles II. issued a copper coinage of halfpennies and farthings; on the former appears the device of Britannia, taken from the Roman coins relating to Britain. Pennies were not coined till George III.'s reign. The coins of William and Mary have the profiles of the king and



queen one over the other, and the shields of the three kingdoms in the form of a cross on the reverse, with Nassau in the centre. The coinage of William alone, after the death of Mary, is of somewhat improved design, Sir Isaac Newton being then Master of the Mint. Little change in the general design of the coin occurs in the reigns of Anne and George I. On the accession of the House of Hanover, the Hanoverian arms are placed in the fourth shield, and George IV. substituted a quartered shield with Nassau en surtout for the four shields on the reverse of his gold coins. During the greater part of George III.'s reign the coinage was utterly neglected, and the silver pieces in circulation were worn perfectly smooth. When coins were at last issued, the Roman conventionalism of the previous reigns gave way to a more fashionable Greek conventionalism. The quartered shield supplanted the four shields, and on the reverse of the crown appeared a Grecianised St George and the dragon. George IV.'s bust is taken from Chantrey's statue; the rose, thistle, and shamrock, united under a crown, appear on the reverse of his shilling. Silver groats were issued in the reign of William IV. The ensigns of Hanover disappeared at the beginning of the present reign; the reverse of the shilling is even poorer than that of George IV., the words "One shilling," occupy the field, surrounded by an oak branch and a laurel branch; silver pieces of threepence have been introduced. But the principal monetary event is the issue of the silver florin, in value equivalent to two shillings, looked on as a step towards the institution of a decimal coinage. It represents the head of the Queen crowned, with the legend in old English character, and for reverse the four shields are once more placed in the form of a cross.

No native Scottish coinage existed earlier than the 11th century. Coins are extant of Somersel, prince of the Isles of that century, and of Alexander I. of the century following. The silver pennies of William the Lion, and Alexander II. and III., are like contemporary English money, but ruder, and bear the names of the moneyers and place of mintage, generally Edinburgh, Perth, or Berwick. The profiles on the coins of John Balliol, Robert Bruce, and David II. are attempts at portraiture. A remarkable gold piece, first coined by Robert II., is the St Andrew, with the arms of Scotland on the obverse, and St Andrew on his cross on the reverse. In the four succeeding reigns the weight of the silver coins rapidly decreased, and coins of billon, or base metal, were issued, nominally pennies, but three and a half of which eventually passed for a silver penny. The evil increased, and baser and baser alloy was used. Groats of billon, known as placks and half-placks, were coined by James III. James IV.'s coins have a characteristic portrait, and a good deal of artistic feeling. James III. and IV. issued well-executed gold pieces, called unicorns and riders, the type of the one being the unicorn, of the other the king on horseback. A still more beautiful coin was the gold bonnet piece of James V., so called from the cap in the king's portrait. Of Mary, there are a great variety of interesting pieces. The portrait is sometimes crowned, sometimes uncrowned, and on the coin issued soon after Francis's death, has a widow's cap and high-trilled dress. The types in James VI.'s reign are also very various. On his accession to the English throne, the relative value of English and Scottish coins was declared to be as 12 to 1. The coins afterwards issued from the Scottish mint differed from the English, chiefly in having Scotland in the first quarter in the royal shield. The last Scottish gold coinage consisted of pistoles and half-pistoles of Darien gold, about the size of a guinea and half-guinea, struck by William III.; the pistole distinguished by a rising sun under the bust of the king.

The coinage of Ireland is scanty and uninteresting compared with that of Scotland. The coins of English monarchs struck in Dublin resemble much those current in England. Henry VIII. first placed a harp on the Irish coins.

In France, the earliest coins are those of the Merovingian kings, rude imitations of the late Roman and early Byzantine money, and mostly of gold. Under the Carolingian dynasty, deniers and oboles are the prevailing coinage, remarkably rude in fabric, without portrait, and bearing the name of the king and place of mintage. Some coins of Charlemagne, struck at Rome, are of better workmanship. They contain one letter of "Roma" at each extremity of the cross, with the legend "Carolus IP." The coinage improved under the Capetian kings; the fleur-de-lis appears in addition to the cross. In the 13th c. gold pieces were issued, and in the time of Philip VI. both the design and the execution of the coins are beautiful. The coins of Louis XII. are the first that bear the royal portrait. The modern coinage

may be said to begin under Henry II., whose portrait is good. The seigniorial coins of France in the middle ages are of considerable importance, and the medals of Louis XIV. and Napoleon I. are much more interesting than the modern coins.

The medieval coinage of Italy is of great interest. The money of the Lombard kings of Italy and Dukes of Benevento, is little inferior to that of the Greek emperors. There is a beautiful series of gold and silver pieces belonging to Venice, bearing the names of the doges, and having generally for type the doge receiving the gonfalon, or standard of St Mark. The gold florins of Florence, with the lily for device, are no less celebrated, and were imitated by other states. Florence had also a remarkable series of medals, with admirable portraits of persons of note. The coins of the popes, from Hadrian I. down to the 14th c., bear the name of the pope and emperor of the west; those of later date are beautiful in execution, and have seated portraits of the pontiffs, with the cross-keys and mitre for reverse. A remarkable series of medals commemorates the chief events of each reign, one of which, struck after the massacre of St Bartholomew, has for type an angel slaying the Huguenots, and the inscription "Ugonottorum strages." The coins of the Norman princes of Naples struck in Sicily, have the legends partly or wholly in Arabic. Malta has a series, with the arms and effigies of the grand-masters.

The medieval money of Germany comprises coins of the emperors, the electors, the smaller princes, the religious houses, and the towns. The imperial series is extensive and very interesting, though, till near the close of the middle ages, it is rather backward in its art. About the Reformation period, however, there are vigorous portraits both on its current coins and on the medals, and those double dollars which are virtually medals. The coins of the Dukes of Saxony, with their portraits, are equally remarkable. The coins of the archbishops of Cologne, Mainz, and Treves form a very interesting series, the first more especially, with a representation of the cathedral.

The coins of the Low Countries resemble those of France and Germany. The Dutch medals are of interest, more especially those struck in commemoration of events in the war with Spain.

The coins of the Swiss cantons and towns during the early period of Swiss independence bore the heraldic shield of each, drawn with vigorous grotesqueness. There are also pieces struck by ecclesiastical lords, and by different families who had a right of coinage.

The coins of Spain begin with those of the Gothic princes, which are chiefly of gold, and on the model of the trientes and semisses of the lower empire. Some of the early pieces have a rude head of the monarch on one side, and of the emperor on the other. Afterwards, the obverse bears the profile of the monarch, and the reverse a cross of some description, with the name of the place of mintage, and the word "Pius" for legend. In later times, there are two interesting series of coins belonging to the kingdom of Aragon and to the kingdom of Castile and Leon.

The coinages of Norway and Sweden at first resembled the British, and afterwards the German type. From the 10th to the 14th c., bracteates were issued by the ecclesiastics. The coinage of Hungary begins in the 11th c., and has the portraits of the monarchs. The Russian coinage is Byzantine in character, and rude in its art. The earliest pieces are the silver darga of the 14th c., of an oblong shape, with representations of the prince on horseback, and various legendary subjects. Peter the Great introduced the usual European type. There is an important series of bronze coins of the Crusaders, beginning with Tancred, and coming down to the end of the 15th c., including money of the kings of Cyprus and Jerusalem, and other princes established in the east.

In India, the succession of the kings of Bactria, the remotest of the dynasties founded on the ruins of Alexander's empire, has only become known through their recently-discovered coins. There are early rude Hindu coins of the Gupta line, with figures of the Brahminical divinities of a type still in use.

Of the coins of the Mohammedan princes, the oldest gold pieces are the bilingual coins of cities of Syria and Palestine, of the middle of the 7th c. (A.H. 78), barbarous imitations of the latest Byzantine money of Alexandria. Most of the Mohammedan coins are covered exclusively by inscriptions expressive of the elementary principles of the Mohammedan faith. For some centuries, no sovereign except the calif was

allowed to inscribe his name on the coin. Large gold coins of great purity were issued by the Moslem kings of Granada in Spain.

The high prices given for ancient coins have led to numerous forgeries from the 15th c. downwards. Against such imitations, collectors require to be on their guard.

Among the best works on numismatics are Eckhel, "*Doctrina Numorum Veterum*" (Vienna, 1792—1798); Henuin, "*Manuel de Numismatique Ancienne*" (Paris, 1830); Grasset, "*Handbuch der alten Numismatik*" (Leipzig, 1852—1853); Leake, "*Numismata Hellenica*" (London, 1854); Ruding's "*Annals of the Coinage of Great Britain* (London, 1840); Lindsay's "*View of the Coinage of Scotland*" (Cork, 1845); Leblanc, "*Traité Historique des Monnoies de France*" (Paris, 1690); Cappe, "*Die Münzen der Deutschen Kaiser und Könige des Mittelalters*" (Dresden, 1848—1850); Marsden, "*Numismata Orientalia Illustrata* (London, 1823—1825).

**NUMMULITE LIMESTONE**, an important member of the Middle Eocene period, consisting of a limestone composed of nummulites held together by a matrix formed of the comminuted particles of their shells, and of smaller foraminifera. It forms immense masses of the strata which are raised up on the sides of the Alps and Himalayas, and may be traced as a broad band often 1800 miles in breadth, and frequently of enormous thickness, from the Atlantic shores of Europe and Africa, through Western Asia, to Northern India and China. It is known also to cover vast areas in North America.

**NUMMULITES**, or *Nummulina* (Gr. money-fossil), a genus of fossil foraminifera, the shells of which form immense masses of rock of Eocene age. See **NUMMULITE LIMESTONE**. Upwards of 50 species have been described. They are circular bodies of a lenticular shape, varying in magnitude from the merest point to the size of a crown-piece. The shell is composed of a series of small chambers arranged in a concentric manner. The growth of the shell does not take place only around the circumference, but each whorl invests all the preceding whorls, so as to form a new layer over the entire surface of the disk, thus adding to the thickness as well as the breadth, and giving the fossil its lenticular form. A thin intervening space separates each layer from the one which it covers, and this space at the margin swells out to form the chamber. All the internal cavities, however, seem to have been occupied with the living sarcode, and an intimate connection was maintained between them by means of innumerable parallel tubuli, which everywhere pass from one surface to another, and which permitted the passage of the sarcode as freely as do the minute pores or foramina of the living foraminifera.

The name is given to them from their resemblance to coins. In Egypt, where the whole of the Mokkadam Mountains, from the stone of which the pyramids were built, is formed of them, they are called by the natives "*Pharaoh's Pence*."

**NUN**, a member of a religious order of women. The etymology of this name is a subject of some controversy, but there seems every reason to believe that it is from a Coptic or Egyptian root, which signifies "virgin." It is found in use as a Latin word as early as the time of St Jerome ("Ep. to Eustachius," p. 22, c. 6). The general characteristics of the religious orders will be found under the head **MONASTICISM** (q. v.), and under those of the several orders. It is only necessary here to specify a few particulars peculiar to the religious orders of females. Of these the most striking perhaps is the strictness in the regularly authorised orders of nuns of the "cloister," or enclosure, which no extern is ever permitted to enter, and beyond which the nuns are never permitted to pass, without express leave of the bishop. The superiors of convents of nuns are called by the names Abbess, Prioress, and, in general, Mother Superior. They are, ordinarily speaking, elected by chapters of their own body, with the approval of the bishop, unless the convent be one of the class called exempt houses, which are immediately subject to the authority of the Holy See. The ceremony of the solemn blessing or inauguration of the abbess is reserved to the bishop, or to a priest delegated by the bishop. The authority of the abbess over her nuns is very comprehensive, but a precise line is drawn between her powers and those of the priestly office, from which she is strictly debarred. The name of nun is given in general to the sisters of all religious congregations of females who live in retirement and are bound by rule; but it is primitively and

properly applicable only to sisters of the religious orders strictly so-called. See **MONACHISM**.

**NUNC DIMITTIS**, the name given to the canticle of Simeon (Luke ii. 29—32), which forms part of the compline office of the Roman Breviary, and is retained in the evening service of the Anglican Church when it follows the second lesson. On the great festivals in Lent, the music of this canticle is especially grand and imposing.

**NUNCIO** (Ital. *nunzio*, Lat. *nuncius*, a messenger), the name given to the superior grade of the ambassadors sent by the pope to foreign courts, who are all called by the general name or **LEGATE** (q. v.). A nuncio is an ambassador to the court of an emperor or king. The ambassador to a republic, or to the court of a minor sovereign, is called **INTERNUNCIO**.

**NUNCUPATIVE WILL** is a will made by word of mouth. As a general rule, no will is valid unless it is in writing and signed by the testator; but in cases of soldiers and sailors, a verbal or nuncupative will is held to be good, on the ground that there is often no time to draw up a formal will in writing.

**NUNEA'TON**, a small market-town of England, in the county of Warwick, and 18 miles north-east of the town of that name. It contains a small parish church in Gothic, and its Free Grammar School, founded by Edward VI. in 1553, has an annual income from endowment of about £300. Manufactures of ribbons and cotton goods are carried on. Pop. (1871) 7000.

**NUNQUAM INDEBITATUS**, in English Law, means a plea or defence to an action for a debt that the defendant never was indebted; in other words, that no debt is due.

**NURAGHE**, the name of certain structures, of conical shape, in the island of Sardinia, rising 30 or 40 feet above the ground, with two or three stories of domed chambers connected by a spiral staircase. Some are raised on basements of masonry, or platforms of earth. They are made of granite limestone, basalt, porphyry, sandstone, and schist. Their entrances are small and low, and when they have chambers of two stories, the upper chamber is reached by the spiral staircase which has loopholes to admit the light. The tops are supposed to have had a terrace. Although 3000 of them exist, none are perfect. Their masonry is irregular, but not polygonal, and resembles the style of work called Asiatic. Like the round towers of Ireland, and other uninscribed monuments, their object and antiquity are enveloped in much doubt. They have been supposed to be the work of the Pelasgi, the Phœnicians, or Carthaginians, and to have been ancient sepulchres, *Tholi* or *Daedalia*, constructed in heroic times. Skeletons, and other funeral paraphernalia, have been found in them. They have many points of resemblance to the "Burghs" or "Duns" on the northern shores of Scotland, of which the Burgh of Mousa, in Shetland, is perhaps the best example.—De la Marmora, "Voyage en Sardaigne," tom. ii.; Petit Radet, "Nuraghes" (Paris, 1826—1828); Micali, "Ant. Pop. Ital." ii. p. 48; Dennis, "Cities and Cem. of Etruria," ii. p. 161.

**NÜRNBERG** (*Norimberga*, *Nortica*), a fortified city of the Bavarian province of Middle Franconia, situated in 49° 28' n. lat., and 11° 5' e. long. Pop. (1871) 80,000; (1875) 91,017. N. is one of the most remarkable and interesting cities of Germany, on account of the numerous remains of medieval architecture which it presents in its picturesque streets, with their gabled houses, stone balconies, and quaint carvings. No city retains a stronger impress of the characteristics which distinguished the wealthy burgher-classes in the middle ages, while its double lines of fortified walls, separated from each other by public walks and gardens, and guarded by 70 towers, together with the numerous bridges which span the Pegnitz, on whose banks the city is built, give it distinctive features of its own. Among the most remarkable of its numerous public buildings are the old palace or castle, commanding, from its high position, a glorious view of the surrounding country, and interesting for its antiquity, and for its gallery of paintings, rich in gems of early German art; the town-hall, which ranks amongst the noblest of its kind in Germany, and is adorned with works of Albert Dürer, and Gabriel Weyerh; the noble Gothic fountain opposite the cathedral by Schönhof, with its numerous groups of figures, beautifully restored in modern times; and

many other fountains deserving notice. Of the numerous churches of N., the following are the most remarkable: St Lawrence, built between 1270—1473, with its beautiful painted-glass windows, its noble towers and doorway, and the celebrated stone pyx, completed in 1500, by Adam Kraft, after five years' assiduous labor; and the exquisite wood-carvings of Velt Stoss; St Sebald's, with its numerous fine glass-paintings and frescoes by Peter Vischer and other German masters; the cathedral, or Our Lady's, built in 1631, similarly enriched. N. is well provided with educational establishments, and besides a good gymnasium and polytechnic institution, has good schools of art, normal and other training colleges, a public library of 50,000 vols., galleries of art collections, museums, &c.; while the numerous institutions of benevolence are liberally endowed and well maintained. Although the glory of the foreign commerce of N. may be said to have been long extinct, its home trade, which is still of considerable importance, includes the specialties of metal, wood and bone carvings, and children's toys and dolls, which find a ready sale in every part of Europe, and are largely exported to America and the East. In addition to its own industrial commerce, is the seat of a large transfer and exchange business, which owes much of its importance to the facilities of inter-communication afforded by the net-work of railway lines with which the city is connected.

N. was raised to the rank of a free imperial city by the Emperor Henry V., in 1219, previous to which time, Henry IV. had ennobled 38 of the principal burgher families, who forthwith arrogated to themselves supreme power over the N. territory. In the 13th c., we find it under the title of a burgraviate in the hands of the Hohenzollern family, who, in 1417, ceded for a sum of money all their territorial and manorial rights to the magistracy of the city. This measure put a stop to the feuds which had hitherto raged between the burgraves and the municipality, and for a time N. continued to grow rich with the fruits of the great internal trade, which it had long maintained between the traders of the East and the other European marts of commerce. The discovery of the passage by the Cape of Good Hope by opening new channels of communication between Asia and Europe, deprived N. of its ancient monopoly. The Thirty Years' War completed the decay of the city, which suffered severely from both parties in turn. The ancient reputation of N. as a wealthy and loyal city of Germany secured to it, however, special consideration; and in 1806, when the Imperial commissioners reorganised some of the dismembered parts of the old empire, it was allowed to retain its independence, with a territory of 453 square miles, containing 40,000 inhabitants, and drawing a revenue of 800,000 guldens; but in consequence of the disputes in which the free city became involved with the king of Prussia, who had some hereditary claim on the ancient burgraviate, N., alarmed at the prospect of still greater embarrassments, entered into the Rhenish Confederation, and as the result of this alliance, was transferred, in 1806, with the surrender of its entire domain and all rights of sovereignty, to the king of Bavaria.

**NURSE, Military.** In continental armies, the "sisters of charity" usually carry their mission of mercy into the military hospitals. Protestant England having no such organisation to fall back upon, the soldiers have been dependent on the regular male hospital attendants for their care during sickness, or when suffering from wounds. The Crimean campaign, however, disclosed so melancholy a picture of the want of women's co-operation, that a band of self-sacrificing ladies, headed by Mrs Nightingale (q. v.), proceeded to Turkey, and were soon acknowledged as messengers of health and life by the unfortunate wounded. The example thus set has not been without effect. In the Franco-German war of 1870—1871, lady-nurses of various nations ministered in all the military hospitals, tending impartially the numerous wounded of both sides.

**NURSERY,** a garden or portion of a garden devoted to the raising of young plants, to be afterwards planted elsewhere. The ripening of garden seeds for sale is generally also an important part of the trade of the public nurseryman. Many culinary vegetables are very commonly raised from seed in public nurseries, and sold as young plants; the trouble of raising them in small gardens being found too great, although, when there is no public nursery at hand, even the cottage-gardener may be compelled to undertake this trouble for himself, in order to procure a

supply of young kale, cabbage, cauliflower, &c., in fresh and healthy condition. Many flowering plants, as wallflower, stock, sweet-william, &c., are also raised and sold by nurserymen. Another great use of the nursery is the rearing of fruit-trees. In the nursery, the stocks are raised from seed, the grafting is performed, and the training of the young tree, whether for standard, espalier, or wall-tree, is begun. As, with regard to fruit-trees, the selection of grafts is of the utmost importance, the reputation of the nurseryman is particularly to be considered by the purchaser; nor is there any trade in which this is more generally necessary, months, or sometimes years elapsing before the quality of the goods purchased can be experimentally ascertained. The principal, and many of the smaller towns of Britain are well supplied with public nurseries, which is the case also in many countries of continental Europe and in North America. Some of these nurseries are on a very great scale, as those of Messrs Loddige of London, Lawson of Edinburgh, and Booth of Hamburg. The largest nurseries, however, are very much devoted to the rearing of ornamental shrubs and trees, and of forest-trees. Plantations of forest-trees, even when very extensive, are now generally, although not always, made with plants obtained from public nurseries. The exertions made by nurserymen to obtain new plants from foreign countries, have contributed much, not only to the advancement of gardening in its various departments, and of arboriculture, but also of botany.—Much benefit also results from the exchange of the produce of the nurseries of different countries. Thus, bulbous roots are brought to Britain from Holland, from what may be described as nurseries specially devoted to them; roses and orange-trees are imported from the nurseries of France, &c. It often happens that seeds imported from climates more thoroughly adapted to the plants, produce better crops than those raised in a colder climate or under a cloudier sky.

**NUT**, in popular language, is the name given to all those fruits which have the seed enclosed in a bony, woody, or leathery pericarp, not opening when ripe. Amongst the best known and most valuable nuts are the Hazel-nut, Brazil-nut, Walnut, Chestnut, and Cocoa-nut, all of which are edible. Other nuts are used in medicine, and for purposes connected with the arts. Some of the edible nuts abound in a bland oil, which is used for various purposes. In Botany, the term nut (*nut*) is used to designate a one-celled fruit, with a hardened pericarp, containing, when mature, only one seed. The *Achenium* (q. v.) was by the older botanists generally included in this term. Some of the fruits to which it is popularly applied scarcely receive it as their popular designation. The hazel-nut is an excellent example of the true nut of botanists. The name nut, without distinctive prefix, is popularly given in Britain to the hazel-nut, but in many parts of Europe to the walnut.

Many nuts have a considerable commercial value, from their being favorite articles of food: these are the Hazel-nut and its varieties, the Black Spanish, the Barcelona, the Smyrna, the Jerusalem filbert, and the common filbert; the Walnut, Chestnut, Hickory, and Pecan; the Souari, the Cocoa or Coker nuts, and the Brazil or Para nut.

The Barcelona and Black Spanish, as their names imply, are from Spain; the former is the commonest nut of our shops. About 120,000 bags, averaging  $1\frac{1}{2}$  bushel each, or 150,000 bushels, are annually imported into Great Britain. The import value is about 33s. per bag. They are always kiln-dried when we receive them. This is not the case with the black Spanish, of which only about 12,500 three-bushel bags, or about 37,000 bushels, are imported in the beginning of the season, when their value is about 14s. per bushel. From the Black Sea we receive annually about 68,000 bushels of hazel-nuts, worth 10s. per bushel, with from 500 to 1000 bags of the so-called Jerusalem and Mount Atlas filberts. Of chestnuts from Leghorn, Naples, Spain, France and Portugal, we receive annually about 20,000 bushels. The trade in walnuts is very uncertain, and probably never exceeds 5000 bushels. Of the curious three-cornered or Brazil nut from Para and Maranhão, the importation is also very irregular, varying from 800 to 1000 tons, or 1200 to 4000 bushels per annum. About two millions of cocoa-nuts are also imported. The other kinds of nuts are too irregular in their importations to supply any reliable statistics. The annual value of all the nuts imported for use as fruit is computed at about £153,000.

**NUTATION** is a slight oscillatory movement of the earth's axis, which disturbs

the otherwise circular path described by the pole of the earth round that of the ecliptic, known as the "precession of the equinoxes." It is produced by the same causes, viz., the attraction of the sun, moon, and planets (the attraction of the last mentioned being so small as to be quite imperceptible) upon the bulging zone about the earth's equator, though in this case it is the moon alone that is the effective agent. It also, for reasons which need not be given here, depends, for the most part, not upon the position of the moon in her orbit, but of the moon's node. If there was no precession of the equinoxes, nutation would appear as a small elliptical motion of the earth's axis, performed in the same time as the moon's nodes take to complete a revolution, the axis of the ellipse being respectively  $18''\cdot5$  and  $13''\cdot7$ , the longer axis being directed towards the pole of the ecliptic. But this motion, when combined with the more rapid one of precession, causes the pole of the earth's axis to describe a wavy line round the pole of the ecliptic.

The effect of nutation, when referred to the equator and ecliptic, is to produce a periodical change in the obliquity of the ecliptic, and in the velocity of retrogradation of the equinoctial points. It thus gives rise to the distinction of "apparent" from "mean" right ascension and declination, the former involving, and the latter being freed from the fluctuations arising from nutation. This motion is common to all the planets.

**NUT-CRACKER** (*Nucifraga* or *Caryocatactes*), a genus of birds of the family *Corvidæ*, with a straight conical bill, both mandibles terminating in an obtuse point, and tail nearly square at the end. The form and characters are nearly similar to those of crows, but the habits are rather those of jays, and in some respects indicate an approach to woodpeckers. One species (*N. caryocatactes* or *C. nucifraga*), is occasionally seen in Britain, and is not uncommon in many parts of Europe and of Asia, particularly in mountainous regions covered with pines. It is about the size of a jackdaw, but has a longer tail. The plumage is light brown, speckled with white, except on the wings, rump, and tail, which are nearly black. The *N.* frequents the tops of high pines, and is a shy bird.

**NUT-HATCH** (*Sitta*), a genus of birds of the family *Certhiidae*, having a straight conical or prismatic bill, short legs, the hind-toe very strong. They run up and down trees with great agility, moving with equal ease in either direction, and without hopping, so that the motion is rather like that of a mouse than of a bird. They feed on insects, in pursuit of which they examine the crevices, and remove the scales of the bark; also on seeds, as those of pines, and the kernels of nuts, to obtain which they fasten the nut firmly in some crevice of bark or other such situation, and peck at it until the shell is broken, so placing themselves that they sway not merely the head, but the whole body, to give force to the stroke. The English name is said to have been originally *Nut-hack*. One species, the EUROPEAN *N.* (*S. Europæa*), is common in most parts of Europe, and is found in most of the wooded districts of England. Its whole length is about six inches. If taken young, it is easily tamed, and becomes very familiar and amusing; but an old bird caught and put into a cage, is apt to kill itself by violently pecking to force a way out. It soon destroys the wood of a cage.—Other species are found in the East and in North America, where the genus is particularly abundant. Birds nearly allied are found in Australia.

**NUTMEG.** This well-known and favorite spice is the kernel—mostly consisting of the albumen—of the fruit of several species of *Myristica*. This genus belongs to a natural order of exogens called *Myristicaceæ*, which contains about forty species, all tropical trees or shrubs, natives of Asia, Madagascar, and America. They generally have red juice, or a juice which becomes red on exposure to air. The order is allied to *Lauraceæ*. The leaves are alternate and without stipules. The flowers are unisexual, the perianth generally trifid, the filaments united into a column. The fruit is succulent, yet opens like a capsule by two valves. The seed is nut-like, covered with a lacinated fleshy aril, and has an albumen penetrated by its membranous covering. The species of this order are generally more or less aromatic in all their parts; their juice is styptic and somewhat acrid; the albumen and aril contain both a fixed and an essential oil, and those of some species are used as spices. The genus *Myristica* has the anthers united in a cylindrical column, and the cotyledons folded. The species which furnishes the greater part of the nutmegs of commerce is *M. Fra-*

*grana* or *moeschata*; but the long N. (*M. satua*), from the Banda Isles, is now not uncommon in our markets. The common N-tree is about 25 feet in height, with oblong leaves, and axillary few-flowered racemes; the fruit is of the size and appearance of a roundish pear, golden yellow in color when ripe. The fleshy part of the fruit is rather hard, and is of a peculiar consistence, resembling candied fruit; it is often preserved and eaten as a sweetmeat. Within is the nut, enveloped in the curious yellowish-red aril, the *Mace* (q. v.), under which is a thin shining brown shell, slightly grooved by the pressure of the mace, and within is the kernel or nutmeg. Up to 1796, the Dutch being the possessors of the Banda Isles, jealously prevented the N. from being carried in a living state to any other place; but during the conquest and retention of the islands by the British, care was taken to spread the culture of this valuable spice, and plants were sent to Penang, India, and other places, where they are now successfully cultivated; indeed, they have now become established in the West India Islands, and both Jamaica and Trinidad produce excellent nutmegs. Brazil is also found favorable to their culture. The N. is very liable to the attack of a beetle, which is very destructive, and it is a common practice to give them a coating of lime before shipping them to Europe, in order to protect them from its ravages. The Dutch or Batavian nutmegs are nearly always limed, but those from Penang are not, and are consequently of a greater value. The N. yields, by expression, a peculiar yellow fat, called oil of mace, because, from its color and flavor, it was generally supposed to be derived from mace; and by distillation is obtained an almost colorless essential oil, which has very fully the flavor of the nutmeg. Her own settlements now furnish Great Britain with the greater portion of this spice, but some lots of Batavian also come into the market. The quantity imported may be stated as 300,000 pounds' weight, worth, in round numbers, £10,000.

Nutmegs are chiefly used as a spice; but medicinally they are stimulant and carminative. They possess narcotic properties, and in large doses produce stupefaction and delirium, so that they ought not to be used where affections of the brain exist or are apprehended.

Other species of *Myristica*, besides those already named, yield nutmegs sometimes used, but of very inferior quality.—The fruits of several species of *Lauraceae* also resemble nutmegs in their aromatic and other properties; as the cotyledons of *Nectandra Puchury*, the Pichurim Beans of Commerce, and the fruit of *Aerodictidum camara*, a tree of Guiana, the Camara or Ackawal nutmeg. The clove nutmegs of Madagascar are the fruit of *Agathophyllum aromaticum*, and the Brazilian nutmegs of *Cryptocarya moschata*. All these belong to the order *Lauraceae*. The Calabash N. is the fruit of *Monodora myristica*, of the natural order *Anonaceae*.

NUTRIA. See COYPU and RACOONDA.

**NUTRITION.** The blood which is carried by the capillaries to the several tissues of the body is the source from whence all the organs derive the materials of their growth and development; and it is found that there is direct proportion between the vascularity of any part and the activity of the nutrient operations which take place in it. Thus, in nervous tissue and muscle, in mucous membrane and in skin, a rapid decay and renovation of tissue are constantly going on, and these are parts in which the capillaries are the most abundant; while in cartilage and bone, tendon and ligament, the disintegration of tissue is comparatively slow, and the capillaries are much less abundant. Each elementary cell or particle of a tissue seems to have a sort of gland-like power not only of attracting materials from the blood, but of causing them to assume its structure, and participate in its properties. Thus, from the same common source, nerves form nervous tissue, muscles muscular substance, and even morbid growths, such as cancer, have an assimilating power.

Before entering further into the subject of nutrition, it is necessary to understand how it differs from the allied processes of development and growth. All these processes are the results of the plastic or assimilative force by which living bodies are able to form themselves from dissimilar materials (as when an animal subsists on vegetables, or when a plant grows by appropriating the elements of water, carbonic acid, and ammonia); but they are the results of this force acting under different conditions.



Development is the process by which each tissue or organ of a living body is first formed, or by which one, being already incompletely formed, is so changed in shape and composition, as to be fitted for a function of a higher kind, or finally is advanced to the state in which it exists in the most perfect condition of the species.

Growth, which commonly concurs with development, and continues after it, is properly mere increase of a part by the insertion or superaddition of materials similar to those of which it already consists. In growth, properly so called, no change of form or composition occurs; parts only increase in weight, and usually in size; and if they acquire more power, it is only more power of the same kind as that which they before enjoyed.

Nutrition, on the other hand, is the process by which the various parts are maintained in the same general conditions of form, size and composition, which they have already by development and growth attained. It is by this process that an adult person in health maintains for a considerable number of years the same general outline of features, and nearly the same size and weight, although during all this time the several tissues of his body are undergoing perpetual decay and re-ovation. In many parts, this removal and renewal of the particles is evident. In the glands—the Kidneys (q. v.), for example—the cells of which they are mainly composed are being constantly cast off; yet each gland maintains its form and proper composition, because for every cell that is thrown off, a new one is produced. In the epidermis of the skin, a similar process is perpetually going on before our eyes. In the muscles, a similar change may be readily traced, for, within certain limits, an increased amount of exercise is directly followed by an increased excretion of the ordinary products of the decomposition of the nitrogenous tissues—viz., urea, carbonic acid, and water. Again, after prolonged mental exertion, there is often a very marked increase in the amount of alkaline phosphates in the urine, which seems to shew that in these cases there is an excessive oxidation of the phosphores of the brain; and yet, in consequence of the activity of the reparative process, neither the muscles nor the brain diminish in size.

It may be regarded as an established fact in physiology, that every particle of the body is formed for a certain period of existence in the ordinary conditions of active life, at the end of which period, if not previously destroyed by excessive exercise, it is absorbed or dies, and is cast off. (The hair and deciduous or milk teeth afford good illustrations of this law.) The less a part is exercised, the longer its component particles appear to live. Thus, Mr Paget found that, if the general development of the tadpole be retarded by keeping it in a cold, dark place, and if hereby the functions of the blood corpuscles be slowly and imperfectly discharged, the animal will retain its embryonic state for several weeks longer than usual, and the development of the second set of corpuscles will be proportionally postponed, while the individual life of the corpuscles of the first set will be, by the same time, prolonged.

For the due performance of the function of nutrition, certain conditions are necessary, of which the most important are—1, a right state and composition of the blood, from which the materials of nutrition are derived; 2, a regular and not far distant supply of such blood; 3, a certain influence of the nervous system; and 4, a natural state of the part to be nourished.

1. There must be a certain adaptation peculiar to each individual between the blood and the tissues. Such an adaptation is determined in its first formation, and is maintained in the concurrent development and increase of both blood and tissues. This maintenance of the sameness of the blood is well illustrated by the action of vaccine matter. By the insertion of the most minute portion of the virus into the system, the blood undergoes an alteration which, although it must be inconceivably slight, is maintained for several years; for even very long after a successful vaccination, a second insertion of the virus may have no effect, because the new blood formed after the vaccination continues to be made similar to the blood as altered by the vaccine matter. So, in all probability, are maintained the morbid states of the blood which exist in syphilis and many other chronic diseases; the blood once inoculated, retaining for years the taint which it once received. The power of assimilation which the blood exercises in these cases is exactly comparable with that of maintenance by nutrition in the tissues; and evidence of the adaptation between the blood and the tissues, and of the delicacy of the adjustment by which it is main-

tained, is afforded by the phenomena of symmetrical diseases (especially of the skin and bones), in which, in consequence of some morbid condition of the blood, a change of structure affects in an exactly similar way the precisely corresponding parts on the two sides of the body, and no other parts of even the same tissue. These phenomena (of which numerous examples are given in two papers by Dr W. Budd and Mr Paget in the 25th volume of the "Medico-chirurgical Transactions") can only be explained on the assumption—1st, of the complete and peculiar identity in composition in corresponding parts of opposite sides of the body; and 2dly, of so precise and complete an adaptation between the blood and the several parts of each tissue, that a morbid material being present in the blood, may destroy its fitness for the nutrition of one or two portions of a tissue, without affecting its fitness for the maintenance of the other portions of the same tissue. If, then, the blood can be fit for the maintenance of one part, and unfit for the maintenance of another part of the same tissue (as the skin or bone), how precise must be that adaptation of the blood to the whole body, by which in health it is always capable of maintaining all the different parts of the numerous organs and tissues in a state of integrity.

2. The necessity of an adequate supply of appropriate blood in or near the part to be nourished, is shewn in the frequent examples of atrophy of parts to which too little blood is sent, of mortification when the supply of blood is entirely cut off, and of defective nutrition when the blood is stagnant in a part. The blood-vessels themselves take no share in the process, except as the carriers of the nutritive matter; and provided they come so near that the latter may pass by imbibition, it is comparatively unimportant whether they ramify within the substance of the tissue, or (as in the case of the non-vascular tissues, such as the epidermis, cornea, &c.) are distributed only over its surface or border.

3. Numerous cases of various kinds might be readily adduced to prove that a certain influence of the nervous system is essential to healthy nutrition. Injuries of the spinal cord are not unfrequently followed by mortification of portions of the paralysed parts; and both experiments and clinical cases shew that the repair of injuries takes place less completely in parts paralysed by lesion of the spinal cord than in ordinary cases. Division of the trunk of the trifacial nerve has been followed by incomplete nutrition of the corresponding side of the face, and ulceration of the cornea is a frequent consequence of the operation.

4. The fourth condition is so obvious as to require no special illustration.

For further information on this most important department of physiology, the reader is referred to Mr Paget's "Surgical Pathology," or to his original lectures on Nutrition, Hypertrophy, and Atrophy (published in volume 39 of "The Medical Gazette"), or to the chapter on "Nutrition and Growth," in Kirkes's "Handbook of Physiology," which contains an excellent abstract of Mr Paget's views, and to which we are indebted for the greater part of this article.

**NUX VO'MICA** is the pharmacopœial name of the seed of *Strychnos Nux Vomica*, or *Poison Nut*. The following are the characters of these seeds, which are imported from the East Indies: "Nearly circular and flat, about an inch in diameter, umbilicated and slightly convex on one side, externally of an ash-gray color, thickly covered with short silky hairs, internally translucent, tough and horny, taste intensely bitter, inodorous."—"The British Pharmacopœia," p. 99.

For the genuine characters, see the article **STRYCHNOS**.—The *N. V.* tree is a native of Coromandel, Ceylon, and other parts of the East Indies. It is a tree of moderate size, with roundish-oblong, stalked, smooth leaves, and terminal corymbs. The fruit is a globular berry, about as large as a small orange, one-celled, with a brittle shell, and several seeds lodged in a white gelatinous pulp.—The bark is known as *False Angostura Bark*, having been confounded with *Angostura Bark*, in consequence of a commercial fraud, about the beginning of the present c.; but its properties are very different, as it is very poisonous.

The seeds contain (in addition to inert matters, such as gum, starch, woody fibre &c.) three alkaloids closely related to each other, which act as powerful poisons on the animal frame, and speedily occasion violent tetanic convulsions and death. These alkaloids or bases are named *Strychnia*, *Brucia*, and *Igasuria*, and exist in the seeds in combination with lactic and strychnic (or Igasuric) acid. For a good method of obtaining pure strychnia, which is by far the most important of the three bases, the reader is referred to p. 323 of "The British Pharmacopœia."

*Strychnia* ( $C_{42}H_{22}N_2O_4$ ) occurs in "right square octahedrons or prisms, colorless and inodorous, scarcely soluble in water, but easily soluble in boiling rectified spirit, in ether, and in chloroform. Pure sulphuric acid forms with it a colorless solution, which, on the addition of bichromate of potash, acquires an intensely violet hue, speedily passing through red to yellow."—*Op. cit.* In nitric acid, it ought, if pure, to form a colorless solution; if the solution is reddish, it is a sign that brucia is also present. Strychnia combines with numerous acids, and forms well-marked salts, which are amenable to the same tests as the base itself.

*Brucea* ( $C_{16}H_{22}N_2O_8 + 8\text{ Aq}$ ) is insoluble in ether, but more soluble in water and in strong alcohol than strychnia; and it is the most abundant of the three alkaloids in nux vomica. It acts on the animal economy similarly to, but much less actively than strychnia, from which it may be distinguished not only by its different solubility, but by the red color which is imparted to it by nitric acid, and which changes to a blue violet on the addition of protochloride of tin. Like strychnia, it forms numerous salts.

*Igasuria* seems closely to resemble brucia in most respects. Little is known regarding *Igasuric Acid*.

Strychnia, brucia, and igasuria occur not only in nux vomica but in the seeds of *Strychnos ignatii* (St Ignatius's beans), and in the seeds and other parts of several plants of the genus *Strychnos*. The amount of strychnia present in these substances varies from 0.5 to 1.5 per cent.

Nux vomica, according to the experiments of Marcei, acts on vegetables as a poison. His experiments were, however, confined to the haricot bean and the lilac. It is poisonous in a greater or lesser degree to most animals, though larger quantities are required to kill herbivorous than carnivorous animals. Thus, a few grains will kill a dog, but some ounces are required to destroy a horse. It is believed, however, that the bird called *Buceros Rhinoceros* eats the nuts with impunity; and a peculiar kind of *Acartus* lives and thrives in the extract of the nuts. Dr Pereira describes three degrees of the operation of this substance on man. 1. In very small doses, its effects are tonic and diuretic, and often slightly aperient. 2. In larger doses, there is a disordered state of the muscular system; the limbs tremble; a slight rigidity or stiffness is felt when an attempt is made to put the muscles in action; and the patient experiences a difficulty in keeping the erect posture. If the use of the medicine be continued, these effects increase in intensity, and the voluntary muscles are thrown into a convulsed state by very slight causes, as, for example, by inspiring more deeply than usual, or even by turning in bed. It is remarkable that in paralysis the effects are most marked in the paralysed parts. 3. In poisonous doses, the symptoms are tetanus and asphyxia, followed by death. After swallowing a large dose of strychnia (on which the poisonous effects of nux vomica essentially depend), the following phenomena occurred in a case recorded by Taylor in his "Medical Jurisprudence." "A young man, aged seventeen, swallowed forty grains of strychnia. The symptoms came on in about a quarter of an hour; lock-jaw and spasmodic contraction of all the muscles speedily set in, the whole body becoming as stiff as a board; the lower extremities were extended and stiff, and the soles of the feet concave. The skin became livid, the eyeballs prominent, and the pupils dilated and insensible; the patient lay for a few minutes without consciousness, and in a state of universal tetanus. A remission occurred, but the symptoms became aggravated, and the patient died asphyxiated from the spasm of the chest in about an hour and a half after taking the poison." It is difficult to say what is the smallest dose that would prove fatal to an adult. Thirty grains of the powdered nuts, given by mistake to a patient, destroyed life. Three grains of the extract have proved fatal; and in a case quoted by Taylor (*op. cit.*), half a grain of sulphate of strychnia caused death in 14 minutes.

The preparations of nux vomica are the powdered nuts, the extracts, the tincture, and strychnia; the alkaloid being usually preferable, in consequence of its more constant strength. In various forms of paralysis, especially where there is no apparent lesion of structure, nux vomica is a most successful remedy; although there are cases in which it is positively injurious. It is also of service in various affections of the stomach, such as dyspepsia, gastrodynia, and pyrosis. The average dose of the powder is two or three grains, gradually increased; that of the tincture, 10 or 15 minims; and that of the extract half a grain, gradually increased to two or

three grains. The dose of strychnia, when given in cases of paralysis, is at the commencement one-twentieth of a grain three times a day, the dose being gradually increased, till slight muscular twitchings are observed. For gastric disorders, a still smaller dose is usually sufficient, as, for example, one-fortieth of a grain.

N'YA'NZA, Victoria, a great fresh-water lake in Central Africa, discovered by Captain Speke in 1858, explored by Speke and Grant in 1862. The most authentic information that we have about the V. N. is, however, derived from the exploration and circumnavigation of it by Stanley in 1875. The native name, Nyanza, signifies "the water." Its southern point is in lat.  $2^{\circ} 44'$  s., long.  $33^{\circ}$  e. Its northern shore runs nearly parallel to the equator, and is about 20 miles to the north of it. It is estimated to be about 220 miles in length, and 180 in breadth. It is of no great depth; the surface is about 3800 feet above sea-level. There are a number of islands near its shores, the chief of which are Ukerewe in the south-east, and Sasse in the north-west. At its north-east extremity, Lake Baringo, described by the natives as a long narrow basin, seems to be connected with the V. N. by a narrow channel. The countries on the west shores of the lake enjoy a mild and genial climate, and the rainfall is below that of many parts of Britain, being only 49 inches. M'tesa, king of Uganda, seems to be the most powerful monarch on the shores of the lake, his sway extending over a large portion of the northern and western coasts. His subjects possess a considerable degree of civilisation. The most considerable tributary of the V. N. is the Shimiya (see NILE), which flows into its southern extremity in long.  $33^{\circ} 33'$  e. The Nile emerges from the north end of the V. N., at Napoleon Bay, precipitating itself over the Ripon Falls. North-west from Lake N. lies what Speke called Luta N'Zigé Lake, which was described as a narrow reservoir about 230 miles long, through the northern end of which the Nile passes. This lake is now known as the Albert Nyanza (q. v.).

NYA'SSA, or Nyanja (apparently identical with name N'yanza), another lake in the interior of Africa, which Dr Livingstone discovered in 1861 by ascending the river Shire (q. v.). The southern end of the Nyassa, or Star Lake, is in lat.  $14^{\circ} 25'$  s., and its northern end extends to the parallel of  $9^{\circ} 20'$  s. The lake is upwards of 300 miles long, its average breadth being 26, and is 1300 feet above sea-level. The first representatives of a mission on N., founded in honor of Dr Livingstone, carried with them in sections a steamer of steel plates, which was successfully launched on the lake in 1875. None of the rivers flowing into N. are navigable. The lake is in most parts very deep—in many places over 100 fathoms. To the east is a range of mountains 100 miles long, and ranging from 10,000 to 12,000 feet above the lake. The scenery of N. is described as grand in the extreme, though much of the land surrounding it is low and marshy. The population of its shores, once dense, has been sorely scourged by the slave-trade. Something had previously been known about this lake under the name of the Maravi; but the accounts were so vague that latterly it was omitted from the maps of Africa.

NYĀYA (from the Sanscrit *ni*, into, and *āya*, going, a derivative from *i*, to go; hence literally "entering," and figuratively, "investigating analytically"), is the name of the second of the three great systems of ancient Hindu philosophy; and it is apparently so called because it treats analytically, as it were, of the objects of human knowledge, both material and spiritual, distributed by it under different heads or topics; unlike, therefore, the *Vedānta* (q. v.) and *Sāṅkhya* (q. v.), which follow a synthetic method of reasoning, the former of these symptoms being chiefly concerned in spiritual and divine matters, and the latter in subjects relating to the material world and man. The Nyāya consists, like the two other great systems of Hindu philosophy (see MĪMĀṆSĀ and SĀṅKHYA), of two divisions. The former is called NYĀYA (proper), and will be exclusively considered in this article; the other is known under the name of VAISĒSHIKA (q. v.). With the other systems of philosophy, it concurs in promising beatitude, that is, final deliverance of the soul from re-birth or transmigration, to those who acquire truth, which, in the case of the Nyāya, means a thorough knowledge of the principles taught by this particular system.

The topics treated of by the Nyāya are briefly the following: 1. The *pramāṇa*, or instruments of right notion. They are: a. Knowledge which has arisen from

the contact of a sense with its object; *b.* Inference of three sorts (*ā priori*, *ā posteriori*, and from analogy); *c.* Comparison; and *d.* Knowledge, verbally communicated, which may be knowledge of "that whereof the matter is seen," and knowledge of "that whereof the matter is unseen" (revelation). 2. The objects or matters about which the inquiry is concerned (*prameya*). They are: *a.* The Soul (*ātman*). It is the site of knowledge or sentiment, different for each individual coexistent person, infinite, eternal, &c. Souls are therefore numerous, but the supreme soul is one; it is demonstrated as the creator of all things. *b.* Body (*śarīra*). It is the site of action, of the organs of sensation, and of the sentiments of pain or pleasure. It is composed of parts, a framed substance, not inchoative, and not consisting of the three elements, earth, water, and fire, as some say, nor of four or all the five elements (*viz.* air and ether in addition to the former), as others maintain, but merely earthy. *c.* Organs of sensation (*indriya*); from the elements, earth, water, light, air, and ether, they are smell, taste, sight, touch, and hearing. *d.* Their objects (*artha*). They are the qualities of earth, &c.—*viz.* odor, savor, color, tangibility, and sound. *e.* Understanding (*buddhi*) or apprehension (*upalabdhi*) or conception (*jñāna*), terms which are used synonymously. It is not eternal, as the Sāṅkhya maintains, but transitory. *f.* The organ of imagination and volition (*manas*). Its property is not the giving rise simultaneously to more notions than one. *g.* Activity (*pravṛtti*), or that which originates the utterances of the voice, the cognitions of the understanding, and the gestures of the body. It is therefore oral, mental, or corporeal, and the reason of all worldly proceedings. *h.* Faults or failings (*doṣha*), which cause activity—*viz.* affection, aversion, and bewilderment. *i.* Transmigration (*pretyabhāva*), literally, the becoming born after having died), or the regeneration of the soul, which commences with one's first birth, and ends only with final emancipation. It does not belong to the body, because the latter is different in successive births, but to the soul, because it is eternal. *k.* Fruit or retribution (*phala*), or that which accrues from activity and failings. It is the consciousness of pleasure or of pain. *l.* Pain (*duḥkha*), or that which has the characteristic mark of causing vexation. It is defined as "the occurrence of birth," or the originating of "body," since body is associated with various kinds of distress. Pleasure is not denied to exist, but, according to the Nyāya, it deserves little consideration, since it is ever closely connected with pain. *m.* Absolute deliverance or emancipation (*apavarga*). It is annihilation of pain, or absolute cessation of one's troubles once for all.

After (1) "instruments of right notion," and (2) "the objects of inquiry," the Nyāya proceeds to the investigation of the following topics.

3. Doubt (*samśaya*). It arises from unsteadiness in the recognition or non-recognition of some mark, which, if we were sure of its presence or absence, would determine the subject to be so or so, or not to be so or so; but it may also arise from conflicting testimony. 4. Motive (*prayojana*), or that by which a person is moved to action. 5. A familiar case (*dṛśyātānta*), or that in regard to which a man of an ordinary and a man of a superior intellect entertain the same opinion. 6. Tenet or dogma (*siddhānta*). It is either "a tenet of all schools," i. e. universally acknowledged, or "a tenet peculiar to some school," i. e. partially acknowledged; or "a hypothetical dogma," i. e. one which rests on the supposed truth of another dogma; or "an implied dogma," i. e. one the correctness of which is not expressly proved, but tacitly admitted by the Nyāya. 7. The different members (*avagama*) of a regular argument or syllogism (*nyāya*). 8. Confutation or reduction to absurdity (*tarka*). It consists in directing a person who does not apprehend the force of the argument as first presented to him, to look at it from an opposite point of view. 9. Ascertainment (*nirṇaya*). It is the determination of a question by bearing both what is to be said for and against it, after having been in doubt. The three next topics relate to the topic of controversy, *viz.* 10. Discussion (*vāda*), which is defined as consisting in the defending by proofs on the part of the one disputant, and the controverting it by objections on the part of the other, without discordance in respect of the principles on which the conclusion is to depend; it is, in short, an honest sort of discussion, such, for instance, as takes place between a preceptor and his pupil, and where the debate is conducted without ambition of victory. 11. Wrangling (*jalpa*), consisting in the defence or attack of a proposition by means of tricks, futilities, and such like means; it is

therefore a kind of discussion where the disputants are merely desirous of victory, instead of being desirous of truth. 12. *Cavilling* (*vitan'd'd*), when a man does not attempt to establish the opposite side of the question, but confines himself to carp- ing disingenuously at the arguments of the other party. 13. *Fallacies* or semblances of reasons (*hetvābhāsa*), five sorts of which are distinguished, viz. the erratic, the contradictory, the equally available on both sides, that which, standing itself in the need of proof, does not differ from that which is to be proved, and that which is adduced when the time is not that when it might have availed. 14. *Tricks*, or unfairness in disputation (*chhala*), or the opposing of a proposition by means of assuming a different sense from that which the objector well knows the proponder intended to convey by his terms. It is distinguished as verbal misconstruing of what is ambiguous, as perverting, in a literal sense, what is said in a metaphorical one, and as generalising what is particular. 15. *Pitiful objections* (*jāti*), of which twenty-four sorts are enumerated; and, 16. Failure in argument or reason of defeat (*nigraha-sādhana*), of which twenty-two distinctions are specified.

The great prominence given by the Nyāya to the *method*, by means of which truth might be ascertained, has sometimes misled European writers into the belief, that it is merely a system of formal logic, not engaged in metaphysical investigations. But though the foregoing enumeration of the topics treated by it could only touch upon the main points which form the subject-matter of the Nyāya, it will sufficiently shew that the Nyāya intended to be a complete system of philosophical investigation; and some questions, such as the nature of intellect, articulated sound, &c., or those of genus, variety, and individual, it has dealt with in a masterly manner, well deserving the notice of western speculation. That the atomistic theory has been devolved from it, will be seen under the article VAIS'ESHKA. On account of the prominent position, however, which the *method* of discussion holds in this system and the frequent allusion made by European writers to a Hindu syllogism, it will be expedient to explain how the Nyāya defines the "different members of a syllogism" under its seventh topic. A regular argument consists, according to it, of five members—viz. *a*. the proposition (*pratijñā*), or the declaration of what is to be established; *b*. the reason (*hetu*), or "the means for the establishing of what is to be established;" *c*. the example (*udāharan'a*), i. e. some familiar case illustrating the fact to be established, or inversely, some familiar case illustrating the impossibility of the contrary fact; *d*. the application (*upanaya*), or "re-statement of that in respect of which something is to be established;" and *e*. the conclusion (*nigamana*), or "the re-stating of the proposition because of the mention of the reason." An instance of such a syllogism would run accordingly thus: *a*. This hill is fiery, *b*. for it smokes, *c*. is a culinary hearth, or (inversely) not as a lake from which vapor is seen arising, vapor not being smoke, because a lake is invariably devoid of fire; *d*. accordingly, the hill is smoking; *e*. therefore, it is fiery.

The founder of the Nyāya system is reputed under the name of *Gotama*, or, as it also occurs, *Gautama* (which would mean a descendant of Gotama). There is, however, nothing as yet known as to the history of this personage or the time when he lived, though it is probable that the work attributed to him is, in its present shape, later than the work of the great grammarian Pāṇini. It consists of five books or *Adhyāyas*, each divided into two "days," or diurnal lessons, which are again subdivided into sections or topics, each of which contains several aphorisms, or *Sūtras*. See ŚĒTRA. Like the text-books of other sciences among the Hindus, it has been explained or annotated by a triple set of commentaries, which, in their turn, have become the source of more popular or elementary treatises.—The Sanscrit text of the *Sūtras* of Gotama, with a commentary by *Viś'vanātha*, has been edited at Calcutta (1823); and the first four books, and part of the fifth, of the text, with an English version, an English commentary, and extracts from the Sanscrit commentary of *Viś'vanātha*, by the late Dr J. R. Ballantyne (Allahabad, 1850–1854). This excellent English version and commentary, and the celebrated Essay on the Nyāya, by H. T. Colebrooke ("Transactions of the Royal Asiatic Society," vol. i. London, 1827; and reprinted in the "Miscellaneous Essays," vol. i. London, 1837), are the best guide for the European student, who, without a knowledge of Sanscrit, would wish to familiarise himself with the Nyāya system.

NYCTAGINACEÆ, a natural order of exogenous plants, consisting partly of

**Nycteribia**  
**Nystadt**

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herbaceous plants, both annual and perennial, and partly of shrubs and trees. Lindley ranks them in his *Chenopodæ Alliance*. The flowers are either clustered or solitary, and either the cluster or the flower often has an involucre, which is often gaily colored. The perianth is tubular, plaited in bud, colored; the limb entire or toothed, deciduous. The stamens are equal in number to the lobes of the perianth. The ovary is superior, with one ovule and one style. The fruit is a thin *carpopsis*, enclosed within the enlarged and indurated base of the perianth.—There are about 100 known species, natives of warm countries. Some have flowers of considerable beauty, as those of the genus *Mirabilis*, known in our gardens as *Marvel of Peru*, one of which, *M. Jalapa*, was at one time erroneously supposed to produce jalap. The roots of many are fleshy, purgative, and emetic. Those of *Boerhaavia paniculata* are used instead of ipecacuanha both in Guiana and in Java.

**NYCTERIBIA**, an extremely curious genus of insects, ranked in the order *Diptera*, although very different from most of that order, and having neither wings nor balancers. Its nearest alliance is with *Hippoboscidae* (see **FOREST FLY** and **SNEB TICK**), which it resembles particularly in parasitic habits, and in the retention of the eggs within the abdomen of the female, until they have not only been hatched, but have passed from the larva into the pupa state. The form, however, is so spider-like, that these insects were at first ranked among the *Arachnida*. The few species known are all parasitic on bats, on which they run about with great activity. The head is very small, curiously affixed to the back of the thorax, and when the creature sucks the blood of the bat, upon which it lives, it places itself in a reversed position.

**NYIREGYHÁZA**, a town of Hungary, in the county of Szabolcs, on the railway between Debreczin and Tokay. The trade in agricultural produce is considerable. N. has salt, soda, and saltpetre works. There are mineral springs in the neighborhood. Pop. (1869) 21,896.

**NY'KERK**, or Nieuwkerk, on the Veluwe, is a very flourishing and well-built town, near the Zuider Zee, in the province of Gelderland, Netherlands, 25 miles north-west of Arnhem. Pop. 8000. It has a good harbor, which is connected with the sea by a wide canal of 1½ miles in length. In the neighborhood are fine rich meadow-pastures and lands suited for all kinds of grain, tobacco, potatoes, &c. Tobacco is extensively grown; many cattle are raised; and a brisk trade carried on both with the surrounding country and Amsterdam, the market to which the cattle, tobacco, dairy, and other agricultural produce, together with much firewood, are sent. N. has a handsome Reformed church, a Roman Catholic chapel, a synagogue, orphan-house, and good schools. There are several manufactures carried on, which also give employment to the people. In Netherlands' church history, N. is famed as the place where a great religious movement began at the middle of last century. The history of the movement, which spread throughout the land, contains all the marks of the later revivals in America, Scotland, and Ireland. See Ypey and Dermout's "Geschiedenis der Nederd. Her. Kerk," vol. iv.

**NY'KÖPING**, a seaport of Sweden, pleasantly situated on the Baltic, in lat. 59° 45' n. long. 17° e., about 60 miles south-west of Stockholm. It comprises among its manufacturing products cotton goods, stockings, tobacco, &c., and has good shipyards, mills, and manufactories for machinery, while in the vicinity of the town are extensive paper-mills. The ruined old castle of N., nearly destroyed by fire in 1665, and which ranked in point of strength next to those of Stockholm and Calmar, has experienced many eventful vicissitudes of fortune. King Valdemar of Sweden, after his dethronement in 1258, was imprisoned here till his death in 1302; but the most tragic incident connected with N. Castle was the horrible death within its walls of the Dukes Eric and Valdemar, who, after being entrapped by their parricidal brother, King Birger, in 1317, were left to perish of hunger in a dungeon, the keys of which the king threw into the sea before he left the castle. The horror of this deed roused the indignation of the people, who seized upon the castle, sacked it, and demolished its keep and donjons. In 1719, the town was taken and dismantled by the Russians; and since then it has ceased to be the scene of any events of historical interest. It is noted for the pure Swedish spoken by its inhabitants. Pop. 4825.

**NYL-GHAU** (*Antelope, picta*, or *Portax tragocamelus*), a species of antelope,

with somewhat ox-like head and body, but with long slender limbs, and of great activity and fleetness. It is one of the largest of antelopes, and is more than four feet high at the shoulder. The horns of the male are about as long as the ears, smooth, black, pointed, slightly curved forwards. The female has no horns. The neck is deep and compressed, not rounded as in most of the antelopes. A slight mane runs along the neck and part of the back, and the breast is adorned with a long hanging tuft of hair. The back is almost elevated into a hump between the shoulders. The *N.* inhabits the dense forests of India and Persia, where it has long been regarded as one of the noblest kinds of game. It is often taken, like other large animals, by the enclosing of a large space with nets, and by great numbers of people. It is a spirited animal, and dangerous to a rash assailant. It is capable of domestication, but is said to manifest an irritable and capricious temper.

**NYMPHÆACEÆ**, a natural order of exogenous plants, growing in lakes, ponds, ditches, and slow rivers, where their fleshy rootstocks are prostrate in the mud at the bottom; and their large, long-stalked, heart-shaped, or peltate leaves float on the surface of the water. Their flowers also either float, or are raised on their stalks a little above the water. The flowers are large, and often very beautiful and fragrant. There are usually four sepals, and numerous petals and stamens, often passing gradually into one another. The ovary is many-celled, with radiating stigmas, and very numerous ovules, and is more or less surrounded by a large fleshy disc. The seeds have a farinaceous albumen. More than fifty species are known, mostly natives of warm and temperate regions. The rootstocks of some of them are used as food, and the seeds of many.—See **WATER-LILY**, **LOTUS**, **VICTORIA**, and **EURYALE**.—Very nearly allied to *N.* are *Nelumbiaceæ*. See **NELUMBO**.

**NYMPHS**, in Classic Mythology, female divinities of inferior rank, inhabiting the sea, streams, groves, meadows and pastures, grottoes, fountains, hills, glens, trees, &c. Among the *N.*, different classes were distinguished, particularly the *Oceanides*, daughters of Oceanus (*N.* of the great ocean which flows around the earth), the *Nereids*, daughters of Nereus (*N.* of the inner depths of the sea, or of the Inner Sea—the Mediterranean), *Potameides* (River *N.*), *Naiads* (*N.* of fountains, lakes, brooks, wells), *Oreades* (Mountain *N.*), *Dryads* or *Hamadryads* (Forest *N.*, who were believed to die with the trees in which they dwelt). They were the goddesses of fertilising moisture, and were represented as taking an interest in the nourishment and growth of infants, and as being addicted to the chase (companions of the divine huntress Diana), to female occupations, and to dancing. They are among the most beautiful conceptions of the plastic and reverent (if credulous) fancy of the ancient Greeks, who, in the various phenomena of nature—the rush of sea-waves, the bubble of brooks, the play of sunbeams, the rustle of leaves, and the silence of caves—felt, with a poetic vividness that our modern science will hardly permit us to realise, the presence of unseen joyous powers.


**NYSSA**. See **TUPÉLO**.

**NYSTADT**, a town of Finland, on the eastern coast of the Gulf of Bothnia, 50 miles south of Bornöborg. Here, in 1721, a treaty was agreed to, between Russia and Sweden, by virtue of which all the conquests of Peter the Great along the coasts of the Gulf of Finland were annexed to Russia. Pop. (1867) 3253.



## O

O, the fifteenth letter in the English and in most western alphabets, is one of the five simple vowel signs of the English language. As the language is at present pronounced, it stands for at least four distinct sounds, heard in the words *note*, *nôr*, (*nôl*), *move*, *son*. The primary and simple sound of O is that heard long in *nôr*, and short in *nôl*, *tôp*. The sound given to it in such words as *note*, *go*, is really a diph-

thong—a long *o* terminating in a slight *u* or *oo* sound (). The corresponding

letter in the Hebrew and Phœnician Alphabet (q. v.) was called Ayn, i. e., “eye;” and accordingly the primitive form of the Phœnician letter was a rough picture of an eye, which naturally became a circle with a dot in the centre—still to be seen in some ancient inscriptions—and then a simple circle.

O', a prefix in many Irish family names, serves to form a patronymic, like *Mac* in Gaelic names; as O'Brien, a descendant of Brien. By some it is considered to be derived from *of*; but it is more likely from Ir. *ua*, Gael. *ogha*, a grandson. In the Lowland Scottish, the word *oe* is used for grandson, and in some localities for nephew.

OA'HU, one of the Sandwich Islands (q. v.).

OAJA'CO, Oaxaca, or Gnaxaca, a city of Mexico, capital of a state of the same name, stands on the river Rio Verde, 210 miles south-south-east of Mexico. It covers an area 2 miles in length by 1½ in breadth, is well built, with open streets, interspersed with plantations, on which the cochineal insect feeds, and has about 25,000 inhabitants. Silk, cotton, sugar, and chocolate are manufactured.

OAK (*Quercus*), a genus of trees and shrubs of the natural order *Cupulifera*, having a three-celled ovary, and a round (not angular) nut—which is called an *acorn*—placed in a scaly truncated cup, the lower part of it invested by the cup. The species are very numerous, natives of temperate and tropical countries. A few species are found in Europe. North America produces many; and many are natives of mountainous regions in the torrid zone; some are found at low elevations in the valleys of the Himalays, some even at the level of the sea in the Malay peninsula and Indian islands. But in the peninsula of India and in Ceylon, none are found; and none in tropical Africa, in Australia, or in South America. The oaks have alternate simple leaves; which are entire in some, but in the greater number variously lobed and sinuated or cut; evergreen in some, but more generally deciduous. Many of them are trees of great size, famous for the strength and durability of their timber, as well as for the majesty of their appearance, and their great longevity.—Throughout all parts of Europe, except the extreme north, two species are found, or varieties of one species, the COMMON OAK (*Q. robur*); one (*Q. pedunculata*) having the acorns on longish stalks, the other (*Q. sessiliflora*) having them almost without stalks. Other differences have been pointed out; but they are regarded by some of the most eminent and careful botanists as merely accidental, and not coincident with these; while, as to the length of the fruit-stalks, every intermediate gradation occurs. Both varieties occur in Britain, the first being the most prevalent, as it is generally in the north of Europe; the second being more abundant in more southern countries. The short-stalked oak is sometimes called DORMAST OAK in England. It has been much disputed which

is entitled to be considered the true British oak; and much alarm has occasionally been expressed lest new plantations should be made of the wrong kind; whilst the most contradictory statements have been made as to the comparative value and characters of the timber. The oak succeeds best in loamy soils, and especially in those that are somewhat calcareous. It cannot endure stagnant water. It succeeds well on soils too poor for ash or elm; but depends much on the depth of the soil, its roots penetrating more deeply than those of most other trees. Noble specimens of oak trees, and some of them historically celebrated, exist in almost all parts of Britain; but are much more frequent in England than in Scotland. The former existence of great oak forests is attested by the huge trunks often found in bogs. The oak attains a height of from 50 to 100 or even 150 or 180 feet; the trunk being four, six, or even eight feet in diameter. It sometimes grows tall and stately, but often rather exhibits great thickness of bole and magnitude of branches. It reaches its greatest magnitude in periods varying from 120 to 400 years, but lives to the age of 600, or even 1000. The timber is very solid, durable, peculiarly unsusceptible of the influence of moisture, and therefore eminently adapted for ship-building. It is also employed in carpentry, mill-work, &c.—The bark abounds in tannin; it also contains a peculiar bitter principle called *Quercine*, and is used in medicine, chiefly in gargles, &c., on account of its astringency, sometimes also as a tonic; it is used along with gall-nuts in the manufacture of ink; but most of all for tanning (see BARK), and on this account the oak is often planted as copse-wood (see COPSE) in situations where it cannot be expected to attain to great size as a tree. The timber of copse oak is excellent fire-wood. The oak is particularly fitted for copse-wood, by the readiness with which it springs again from the stools after it has been cut.—Acorns are very nourishing food for swine, and in times of scarcity have been often used for human food, as, indeed, they commonly are in some very poor countries, either alone or mixed with meal. The bitterness which makes them disagreeable is said to be in part removed by burying them for a time in the earth. The acorns of some trees are also much less bitter than others, and oaks of the common species occur which produce acorns as sweet as chestnuts. Other varieties of the common oak are assiduously propagated by nurserymen as curious and ornamental, particularly one with pendulous branchlets (the *Weeping Oak*), and one with branches growing up close to the stem, as in some kinds of poplar. Among the Greeks and Romans, the oak was sacred to Zeus or Jupiter; and it has been connected with the religious observances of many nations, as of the ancient Celts and Germans.—The TURKEY OAK OR ADRIATIC OAK (*Q. cerris*), now very frequently planted in Britain, is a large and valuable tree, very common in the south-east of Europe, and in some parts of Asia. The timber is imported in considerable quantity into Britain for ship-building and other purposes. The leaves differ from those of the common oak in their acute lobes, and the cups of the acorns are mossy, i. e., have long, loose, acute scales. Similar to this, in both these respects, are the AUSTRIAN OAK (*Q. Austriaca*), abundant near Vienna, and the SPANISH OAK (*Q. Hispanica*).—The CORK OAK OR CORK-TREE (*Q. Suber*) is noticed in the article CORK; the HOLM OAK OR EVERGREEN OAK (*Q. ilex*), another of the species found in the south of Europe, in the article ILEX.—Of the North American oaks, some are very valuable as timber trees. Perhaps the most important is the WHITE OAK OR QUEBEC OAK (*Q. alba*), a large tree, the leaves of which have a few rounded lobes. It is found from the Gulf of Mexico to Canada; and in some places forms the chief part of the forest. The timber is less compact than that of the British oak; that of young trees is very elastic.—The OVERCUP OAK (*Q. lyrata*), a majestic tree, highly esteemed for its timber, and having its acorns almost covered by their globular cup, grows chiefly in lands liable to inundation in the Southern States.—The CHESTNUT-LEAVED WHITE OAK (*Q. prinus*) is also a much-esteemed timber tree of the Southern States.—The SWAMP WHITE OAK (*Q. bicolor*), a closely allied species, extends further north.—The LIVE OAK (*Q. virens*), an evergreen species with entire leathery leaves, is regarded as a tree of the first importance in the United States, from the excellence of its timber and its value for ship-building, so that efforts have been made by the government to protect it and to promote the planting of its acorns. Yet it is not a very large tree, being seldom more than forty-five feet in height, with a trunk of two feet in diameter. It grows on the coasts of the Gulf of Mexico, and as far north as Virginia. It once abounded on the Sea Islands, now so

celebrated for their cotton.—The RED OAK (*Q. rubra*), a large tree, with sinuated and lobed leaves, the lobes toothed and bristle-pointed, yields great part of the Red Oak Staves exported from Canada and the north of the United States to the West Indies; but Red Oak Staves are also produced in the Middle and Southern States by the SCARLET OAK (*Q. coccinea*), a very similar species, by the BLACK OAK or QUERCITRON OAK (*Q. tinctoria*), another species with the lobes of the leaves bristle-pointed, better known for the dye-stuff which its bark yields (see QUERCITRON), and by the Willow Oak (*Q. phellos*), a large tree with lanceolate leaves and a willow-like aspect. The timber of all these species is of very inferior quality. These are the American oaks of greatest economical and commercial importance, but there are numerous other species, some of them trees, some mere shrubs, of which some grow on poor soils, and cover them in compact masses; resembling in this a single European species (*Q. viminialis*), a native of the Vosges, 6–8 feet high, with slender tough branches, which makes excellent hedges.—The BLACK JACK (*Q. nigra*) is an American oak, chiefly notable for the abundance in which it grows on some of the poorest soils. It is a small tree, and its timber of little value. The bark is black.—Some of the Nepalese oaks are large and valuable trees, as are some of those of China and Japan, of Java, of Mexico, &c. The oaks of Java and the other Indian islands have generally the leaves quite entire.—The bark of most of the species of oak is capable of being used for tanning, and is used in different countries. The cups and acorns of the VALONIA OAK (*Q. Aegilops*) are exported from the Morea and other parts of the Levant, in great quantities, for this purpose, under the name of *Valonia*. See LEATHER. The tree resembles the Turkey Oak, and has very large hemispherical mossy cups. The cups are said to contain more tannin than any other vegetable substance.—Galls (*q. v.*) or Gall-nuts are in great part obtained from the oak therefore called the GALL-OAK (*Q. infectoria*), a scrubby bush, a native of Asia Minor, with bluntly serrated, ovate-oblong leaves.—The KERMES OAK (*Q. coccifera*), on the leaves of which the Kermes (*q. v.*) insect is found, is a low bush, with evergreen spinous leaves, much resembling a holly, a native of the south-east of Europe.—Of oaks with sweet and edible acorns, may be mentioned the BALLOTE OAK (*Q. Ballota* or *Grammatia*), an evergreen with round spiny-toothed leaves, a native of the north of Africa, the acorns of which are regularly brought to market in Algeria and in Spain, and are long and cylindrical; the Italian Oak (*Q. Esculus*), closely allied to the common oak; and the DWARF CHESTNUT OAK (*Q. chinquapin* or *prinoides*) of North America, a small shrubby species, which has been specially recommended to cultivation on this account. Other North American species, and some of the Himalayan species, also produce edible acorns. From the acorns of some species, oil is made in considerable quantity in different parts of the world, and is used in cookery.—The leaves of the Manna Oak (*Q. mannifera*)—a native of the mountains of Kurdistan, having oblong, blunt-lobed leaves—secrete in hot weather a kind of manna, a sweet mucilaginous substance, which is made into sweetmeats, and very highly esteemed.

The name Oak is sometimes popularly applied to timber trees of very different genera. Thus, AFRICAN OAK is another name of African Teak. See TEAK. Some of the species of *Casuarina* (*q. v.*) are called Oak in Australia. The STONE OAK (*Lithocarpus Javensis*) of Java, so named from the extreme hardness of its timber, is a tree of the same family with the true oaks.

OAK BEAUTY (*Biston prodromaria*), a moth of the family *Geometridæ*, a native of England, about an inch and a half or two inches in expanse of wings; the upper wings with two brown curved bands, and margined with black, the lower wings with one brown band. The caterpillar feeds on the oak.

OA'KHAM, the county-town of Rutlandshire, England, in the vale of Catmos, 25 miles west-north-west of Peterborough. It is a station on the Syston and Peterborough branch of the Midland Railway. In former times, there was a castle here; it is now in ruins, with the exception of the portion used as the county-hall. The church, the interior of which was beautifully restored in 1838, is an edifice in the perpendicular style, and has a fine tower and spire. The Free Grammar-school, with an endowment of about £700 a year, was founded in 1581. Pop. (1871) 2911.

OA'KUM, a tugged mass of tarred hempen fibres, is made from old rope by un-

twisting the strands and rubbing the fibres free from each other. Its principal use is in Caulking (q. v.) the seams between planks, the space round rivets, bolts, &c., for the purpose of preventing water from penetrating.

OANNES, the name of a Babylonian god, who, in the first year of the foundation of Babylon, is said to have come out of the Persian Gulf, or the old Erythraean Sea, adjoining Babylon. He is described as having the head and body of a fish, to which were added a human head and feet under the fish's head and at the tail. He lived amongst men during the daytime, without, however, taking any food, and retired at sunset to the sea, from which he had emerged. O. had a human voice, and instructed men in the use of letters, and in all the principal arts and sciences of civilisation, which he communicated to them. Such is the account of him preserved by Berosus and Apollodorus. Five such monsters are said to have come out of the Persian Gulf; one, called Anedotos or Idotion, in the reign of Amenon, the fourth king of Babylon; another in that of the fifth king; and the last, called Odakon (or Ho Dagon), apparently the Phœnician Dagon, under the sixth. Many figures of O., resembling that of a Triton, having the upper part of a man, and the lower of a fish, or as a man covered with a fish's body, have been found in the sculptures of Kouyunjik and Khorsabad, as well as on many cylinders and gems. O. is supposed to have symbolised the conquest of Babylon by a more civilised nation coming in ships to the mouth of the Euphrates; but he is apparently a water-god, resembling in type and character the Phœnician Dagon, and the Greek Proteus and Triton.

Helladius "Apud Phot. Cod." 279, pp. 535, 34; Richter, "De Beroso;" Cory, "Anc. Fragm." p. 30; 1 Sam. v. 4; Bunsen, "Egypt's Place," vol. i. p. 106; Layard, "Nineveh," p. 343.

OAR, a wooden instrument by which a person sitting in a boat propels it through the water. The oar rests on the *row-lock*, and in many cases some device is resorted to, to retain the oar from slipping outwards. In the Thames, a leathern stop, called a *button*, is used; sometimes a pin in the gunwale of the boat passes through the oar (but this weakens the oar, and precludes *feathering*); at other times, the oar is fastened to the pin by a leathern thong. The action of an oar in moving a boat is that of a lever, the rower's hand being the power, the water the fulcrum, against which the oar presses, and the row-lock the point at which the opposition caused by the weight of the boat and its cargo is felt. *Feathering* an oar consists in turning it, immediately on leaving the water, so that the flat blade of the oar is horizontal, and in preserving this position until just before the fresh dip, when of course the vertical position must be resumed. Feathering diminishes the resistance offered by air, wind, and small waves; it also adds greatly to the beauty and grace of rowing.

The best oars are of Norway fir, though some are made of ash and beech.

O'ASES, certain cultivated spots in the Libyan desert (called also *Anasia*, *Ouasis*, or *Hoasis*) which produce vegetation, owing to the presence of springs issuing from the ground. The principal oases are those lying to the west of Egypt, a few days' journey from the Nile, and known to the ancients by the name of the Greater and Lesser Oases, and that of Ammon. It is supposed that they were known to the Egyptians during the 12th dynasty under the name of *Suten-Khenn*, but no evidence of their occupation by the Egyptians earlier than Darius has been found *in situ*. By some of the ancients they were called the Islands of the Blessed, or compared to the spots on a panther's skin. Their name is supposed to be the Coptic *Ouahé* (Inhabited Place). They are first mentioned by Herodotus in his account of the destruction of the army of Cambyses by the storm of sand, or simoon. Equally celebrated is the visit of Alexander the Great to the oasis, which he successfully accomplished after the conquest of Egypt, and passed through the desert a nine days' journey before he reached the Temple of Ammon, the priests of which declared him the son of that god, and the future conqueror of the entire world. Herodotus describes that of El Wah, or the Oasis Magna of the Romans, which contained the oracle of Ammon, and which lies seven days' journey west of Thebes. It appears to have been anciently frequented by caravans going to the Pillars of Hercules. Strabo mentions three oases: the first seven days' journey west of Abydos; the second, west of the Lake Mœris; the third, near the oracle of Ammon. Pliny mentions two oases; so does Ptolemy, who calls them the Lesser and Greater. Under the Roman empire,

they were used for temporary banishment of criminals of state, and the poet Juvenal was sent there. Olympiodorus, a native of the Thebaid, gives a glowing description of them in the days of Theodosius the Younger. Under the Byzantine emperors, the emperors banished there the heads of the Catholic party, at the instigation of the Arians, in the 4th c., and Athanasius himself is supposed to have taken refuge in them. In the 5th c., Nestorius, the Bishop of Constantinople, was banished there. He was rescued by an excursion of the Blemyes, but expired soon after his arrival at the Nile. The oases were then a place of desolation and horror, occasionally plundered by Beduins. They fell, 943 A.D., into the power of the Arabs, after having been held by the Egyptian monarchs and their successors till that period; and they are described by Edrisi (1150 A.D.) as uninhabited; by Abulfeda (1260 A.D.) and by Leo Africanus (1513 A.D.), as inhabited and cultivated, and quite independent, having three fortresses. The first modern traveller who visited them is supposed to have been Poncet (1698 A.D.). Subsequently, in 1792, Browne discovered the oasis of Ammon at El Siwah; and it was visited in 1793 by Hornemann, and in 1819 by Cailland. It lies in 29° 12' 20" n. lat., and 26° 6' 9" e. long. Drovetti and Minutoli also visited the same spot.

These oases are now held by Muggrebi Arabs, a powerful race in the Desert, capable of raising 30,000 men, who supply camels and guides to travellers. The principal oases are: 1. El Khargeh, or the Oasis Magna, the Greater Oasis of Ptolemy; 2. El Kasr, or Oasis Parva, the Lesser Oasis; 3. Siwah, or the Oasis of Ammon, the most northerly; 4. The Western Oasis, or Dakkel, mentioned by Olympiodorus, and visited by Sir Archibald Edmonstone in 1819, and Rohrs in 1874. Of El Khargeh, full particulars have been given by M. Hoskins, who discovered it lying about 125 miles west of the Nile, having a stream of water rising near the village of Genah, on the north-west of the oasis, and lost in the sand. It is bounded the east by Hagel-bel-Badah. North of El Gem lies the metropolis, El Khargeh, which consists of a series of covered streets and open bazaars. The temple lies two hours' journey from it, in a fine situation; the *sekos* has a vestibule of 500 feet, with pylons, or gateways, the first of which has a decree in Greek, dated in the reign of Galba (68 A.D.), against forcing persons to farm the revenue, preventing imprisonment for debt, preserving the dowries of women, and limiting the office of strategos for three years. The temple has other decrees preventing the officers of government from smuggling. It has an avenue of sphinxes and three pylons; on the third, Darius is represented offering to Amen Ra, Osiris, and Isis; while Nekht-her-hebi (Nectabes) continued the ornaments of the temple about 414–340 B.C. The *sekos* is 140 feet long, and represents Darius offering to Amen Ra, or Khnumis, the ram-headed god, and Osiris; while in the accompanying scenes are seen Anta, or Anaitis, Ruspri, or Reseph. In the vicinity is a magnificent necropolis of 150 sepulchres, of a late period, with Doric and Corinthian capitals. There are several temples at other spots of the oasis. 2. El Kasr, the Oasis Parva, lies four or five days' journey south-east from Siwah, called the Wah-el-Bahman, or Wah-el-Menchch, contains no monuments older than the Roman, consisting of a triumphal arch, subterranean and other aqueducts, several hot springs, a necropolis and Christian church. This oasis was first conquered by the Arabs; and in its vicinity is another oasis called Wady Zerzoora, with others adjoining, of inferior interest. 3. Siwah, or the Oasis of Ammon—one of the first discovered, and repeatedly visited, has, unfortunately, not been seen by any one acquainted with hieroglyphics—lies west of the Natron Lakes. It would appear from Minutoli that the temple was built by Nekht-her-hebi, or Nectabes I., in honor of the god Khnum, Ammon Khnumis or Chnebis, who, as the deity of water, presided over the water from which the oasis originated. The oasis is nine miles broad and two long, contains El Garah Ghariny, and Mencheyeh, has a population of about 8000 inhabitants, possesses date and other trees, grows cereals, and has sulphurous springs, a salt lake at Arachieh, and many ruined temples, a necropolis, and other remains. The oracle of Ammon is supposed to have been at a place called Om-Beydah, or the temple of Nekht-her-hebi. From this, it would seem that the oasis did not fall into the power of Egypt until about the 5th c. B.C. The celebrated Fountain of the Sun is at Siwah Sharieh. It is 30 paces long, 20 broad, six fathoms deep, with bubbles constantly rising to the surface, steaming in the morning, and warmer at night. Close to it are the remains of the sanctuary of Ammon. 4. El Dakkel, or the Western Oasis, lies

about 78 miles southwest of Siout. The principal ruin at Dar-el-Hadjar consists of a small temple, dedicated to Khnum by the Roman emperors, Nero and Titus. At Ain Almoor, between this oasis and the Oasis Magna, is a temple built under the Roman empire.—Herodotus, iii. 26; Strabo, ii. p. 130, xvii. pp. 790, 791, 813; Ptolemy, iv. 6, 37; Minutoli, "Reise zum Tempel des Jupiter Ammon" (Berlin, 1824); Hoskine, "Visit to the Great Oasis" (8vo, Lond. 1837); Champollion, "L'Égypte," p. 282.

OAT, or Oats (*Avena*), a genus of grasses containing many species, among which are some valuable for the grain which they produce, and some useful for hay. The Linnean genus *Avena*, less natural than most of the Linnean genera, has been much broken up. The genus, as now restricted, has the spikelets in loose panicles, the glumes as long as the florets, and containing two or more florets; the paleæ firm and almost cartilaginous, the outer palea of each floret, or of one or more of the florets, bearing on the back a knee-jointed awn, which is twisted at the base. The awn, however, tends to disappear, and often wholly disappears in cultivation. Those species which are cultivated as corn-plants have comparatively large spikelets and seeds, the spikelets—at least after flowering—pendulous. The native country of the cultivated oats is unknown, although most probably it is Central Asia. There is no reference, however, to the oat in the Old Testament; and although it was known to the Greeks, who called it *Bromos*, and to the Romans, it is probable that they derived their knowledge of it from the Celts, Germans, and other northern nations. It is a grain better suited to moist than to dry, and to cold than to warm climates, although it does not extend so far north as the coarse kinds of barley. The grain is either used in the form of Groats (q. v.) or made into meal. Oatmeal cakes and porridge form great part of the food of the peasantry of Scotland and of some other countries. No grain is so much esteemed for feeding horses. Besides a large quantity of starch—about 65 per cent.—and some sugar, gum, and oil, the grain of oats contains almost 20 per cent. of nitrogenous principles, or Proteine (q. v.) compounds, of which about 16 or 17 parts are *Avenine*, a substance very similar to Caseine (q. v.), and two or three parts gluten, the remainder albumen. The husk of oats is also nutritious, and is mixed with other food for horses, oxen, and sheep. From the starchy particles adhering to the husk or seeds after the separation of the grain, a light dish, called *soorans*, is made in Scotland by means of boiling water, was once very popular, and is very suitable for weak stomachs. The grain is sometimes mixed with barley for distillation. The Russian beverage called *quass* is made from oats. The straw of oats is very useful as fodder, bringing a higher price than any other kind of straw.—The varieties of oats in cultivation are very numerous, and some highly esteemed varieties are of recent and well-known origin. It is doubtful if they really belong to more than one species; but the following are very generally distinguished as species: 1. COMMON OAT (*A. sativa*), having a very loose panicle, which spreads on all sides, and two or three fertile florets in each spikelet, the paleæ quite smooth, not more than one floret awned; 2. TARTARIAN OAT (*A. orientalis*), also called HUNGARIAN OAT and SIBERIAN OAT, distinguished chiefly by having the panicle much more contracted, and all turned to one side; 3. NAKED OAT (*A. nuda*), differing from the Tartarian Oat chiefly in having the paleæ very slightly adherent to the seeds, which, therefore, fall readily out of them, whilst in the other kinds they adhere closely; 4. CHINESE OAT (*A. chinensis*), which agrees with the last in the characters of the paleæ and seeds, but is more like the Common Oat in its panicle, and has more numerous florets, 4—8, in the spikelet; 5. SHORT OAT (*A. brevis*), which has a close panicle turned to one side, the spikelets containing only one or two florets, each floret awned, the grains short. Almost all the varieties of oat in cultivation belong to the first and second of these species. The Naked Oat is cultivated in Austria, but is not much esteemed. The Chinese Oat, said to have been brought by the Russians from the north of China, is prolific, but the grain is easily shaken out by winds. The Short Oat is cultivated as a grain-crop on poor soils at high elevations in the mountainous parts of France and Spain, ripening where other kinds do not; it is also cultivated in some parts of Europe as a forage plant.—Besides these, there is another kind of oat, the BRISTLE-POINTED OAT (*A. strigosa*), regarded by some botanists as belonging even to a distinct genus, *Danthonia*, because the lower palea is much prolonged, and instead of merely being bifid at the point, as in the other oats, is divided into two long teeth, extending into bristles. The panicle is

inclined to one side, very little branched; the florets, 2 or 3 in a spikelet, all awned, the grain rather small. This plant is common in cornfields, is cultivated in many countries, but chiefly on poor soils, and was at one time much cultivated in Scotland, but is now scarcely to be seen as a crop.—Not unlike this, but with the panicle spreading equally on all sides, the outer palea merely bifid, and long hairs at the base of the glumes, is the WILD OAT (*A. sativa*), also frequent in cornfields, and a variety of which is cultivated in some northern countries for meal, but which is more generally regarded by farmers as a weed to be extirpated, springing up so abundantly in some districts as to choke crops of better grain. Its awns have much of the hygro-metrical property which gains for *A. sterilis*, a species found in the south of Europe, the name of the ANIMAL OAT, because the seeds when ripe and fallen on the ground resemble insects, and move about in an extraordinary manner through the twisting and untwisting of the awns. The seed of the WILD OAT has been sometimes used instead of an artificial fly for catching trout.—Amongst the species of oat useful not for their grain but for fodder are the DOWNY OAT-GRASS (*A. pubescens*) and YELLOW OAT-GRASS (*A. flavescens*), both referred by some botanists to the genus *Trisetum*—the short awn being like a middle tooth in the bifid palea—and both natives of Britain, the former growing on light ground and dry hills, especially where the soil is calcareous, the latter on light meadow lands.—Other species are found in Britain, continental Europe, North America, Australia, &c. In some parts of the Sahara are bottoms of ravines richly productive of a species of oat-grass (*A. Forstalii*) much relished by camels.

Far more ground is occupied with oats in Scotland than with any other grain. In all the higher districts, it is almost the only kind of grain which is cultivated. Throughout Scotland, it is the crop that is chiefly sown after land has been in pasture for one or more years. The seed is generally sown broadcast over the ploughed land, which is afterwards well harrowed and pulverised. It is of the utmost importance to have the latter operations well done, as it prevents the attacks of insect larvae. On soils that are infested with annual weeds, such as charlock, it is common to drill the seed, which permits the land to be hand-hoed and thoroughly cleaned. Oats thrive best upon deep and rich soils, and yield but poorly on thin sandy soils, where they suffer sooner from drought than barley, rye, or wheat. On good soils, it is common to dress oats with 2 to 3 cwts. of guano to the acre. The plant is not easily injured by large applications of heterogeneous manures. The Potato Oat is a variety generally cultivated in the best soils and climates. It is an early and productive variety. The Hopetoun Oat is also much sown in the earliest districts. The Sandy Oat is still more largely sown, more particularly when the climate is inferior and wet. It is not liable to be lodged with rains, and the straw is of fine quality for fodder. All these are varieties of the Common Oat. The White and Black Tartarian are much cultivated in some districts. They are very productive.—On the continent of Europe, this grain is seldom seen of quality equal to what is produced in Scotland; and even in most parts of England, the climate is less suitable to it, and it is less plump and rich.

OATES (*alias* Ambrose), Titus, was the son of a ribbon weaver, who, having first become an Anabaptist minister under Cromwell, took orders and a benefice in the English Church after the Restoration. Titus appears to have been born about 1620 in London. He was a pupil of Merchant Taylors' School, whence he passed to Trinity College, Cambridge, and received a small living from the Duke of Norfolk. This position, however, he forfeited, in consequence of a malicious prosecution, in which he narrowly escaped conviction for perjury; and having been afterwards appointed to the chaplaincy of one of the king's ships, he was expelled from it on a charge still more disgraceful. In this extremity, he conformed to the Roman Catholic Church, and was admitted as a scholar of the Jesuits' College at Valladolid; but was expelled for misconduct, after a trial of a few months. He was again received by the Jesuits, on his earnest protestations of repentance, at St Omer, where he was no less unsuccessful, and was finally dismissed by them in the early part of 1678. He now, as a mere vagabond adventurer, set himself to live by his wits, in the evil exercise of which he devised, about this time, the atrocious scheme with which his name is identified in history. Just then, great excitement and alarm pervaded the Protestant party in England. It was well known that Charles was at heart a Roman Catholic; and his brother, the Duke of York, afterwards James II.

was an active and avowed zealot on the same side. The growing confidence of the Roman Catholics was un concealed; and with or without instant reason, the cry so often since heard arose, and was everywhere re-echoed, that the "Protestant religion was in danger." In this fevered state of general feeling, O. saw his opportunity, and dexterously and boldly availed himself of it. He communicated to the authorities the details of a pretended plot, the figment of his own brain, the main elements of which were a rising of the Catholic party, a general massacre of Protestants, the burning of the city of London, the assassination of the king, and the invasion of Ireland by a French army. In certain of its items, the fiction was devised with considerable ingenuity to catch the popular belief. By the strangest coincidence, moreover, there just then occurred in aid of it a series of events which seemed conclusively to attest its genuineness. A correspondence, the object of which was the propagation of the Roman Catholic religion, came to light between the secretary of the Duke of York and Pere La Chaise, the confessor and confidant of Louis XIV. Danby, the prime minister, it also appeared, had been busy with intrigues in the same quarter. Finally, Godfrey, the zealous magistrate through whom publicity was first given to "the plot," was found mysteriously murdered. After this, could reasonable doubt exist? Was not the English St Bartholomew already begun? All London went wild with fear and rage; and it seemed at one time likely that a massacre of Roman Catholics would be substituted for the dreaded extermination of the Protestants. The parliament, which might have done something to allay the excitement, was itself swept headlong away by it. The king alone, whose life was threatened, but who, dissolute and indolent as he was, wanted neither courage nor shrewdness, much to his honor, scornfully insisted that the plot was merely some insane delusion, and tried, so far as he could, to control the excesses which followed. Too probably, his interference was of the characteristically easy, *insouciant* kind; in any case, it did not avail. The story of O. was universally believed; and he became the popular hero of the day. A pension of £300 a year was granted him; a suite of apartments in the palace at Whitehall was set apart as sacred to his use; and wherever he went, the Protestant public wildly cheered him as their saviour. With the aid of a set of suborned ruffians, only one degree less foul than himself, convictions of his victims were readily obtained, judges and jurors vying with each other in their unquestioning reception in evidence of the grossest and most manifest perjury; and many innocent Roman Catholic gentlemen died the death of traitors at the block. Over the space of two years, the base success of O. was signalled by a series of judicial murders. Naturally, however, as reason resumed its sway, doubts began to be felt; and on the execution of a venerable and respected nobleman, Viscount Stafford, with a strong shock of pity and remorse, public suspicion awoke, and a violent reaction set in. It was only, however, on the accession of James II. in 1685 that retribution overtook the malefactor. Active steps against him were then taken. He was tried before the Court of King's Bench, convicted of perjury, and sentenced to be pilloried, whipped at the cart's tail, and afterwards imprisoned for life. We might wonder a little at the leniency of the sentence, were it not thus to be explained: it was intended that the severity of the first two items of punishment should render the last one superfluous, and that the wretch should die under the lash of the executioner. But the hide of O. was beyond calculation tough; and horribly lacerated, yet living, his carcass was conveyed to the prison, from which it was meant never more to issue. Very strangely, however, the next turn of the political wheel brought back the monster to the light of day and to prosperity. When the revolution of 1688 placed William on the throne, the Protestant influence triumphed once more. In the outburst of enthusiasm which ensued, what more natural than that O. should be glorified as a Protestant martyr? Parliament solemnly declared his trial an illegal one; he was pardoned, and obtained his liberty; and in order to his perfect enjoyment of it, a pension of £300 a year was granted him. He was, however, no more heard of; he passed his seventeen remaining years in obscurity, and died in 1705 at the good old age of eighty-six.

**OATH** (Ang.-Sax. *ath*, Ger. *eid*), in the religious use of the word, may be defined an expressed or implied calling upon the Almighty to witness the truth of an asseveration, or the good faith of a promise; with which is ordinarily conjoined an imprecation of his vengeance, or a renunciation of his favor, in case the assevera-



tion should be false, or the promise should be broken. This practice has prevailed, in some form or other, in almost all the religions of the ancient, as well as of the modern world. It supposes, however, a belief of the existence of a provident Supreme Being, in order to its moral efficacy as a safeguard of truth. Among the Jews, we find instances in Gen. xiv. 22, xxi. 24, xlvii. 31, i. 5, confirmed even by the example of God himself, Numb. xiv. 28, Jerem. xlv. 26, Isai. lxii. 8. It was strictly forbidden to the Jews to swear by false gods (Amos viii. 14, Jerem. xii. 16). The form of oath was probably variable, either a direct adjuration, as "The Lord liveth," or an imprecation, "The Lord do so to me;" but in all cases, the strongest denunciations are held out against the false swearer (Exod. xx. 7, Levit. xix. 17). Oaths were employed, both judicially and extrajudicially, by the ancient Egyptians, Assyrians, Medes, and Persians, as well as by the Greeks, and also by the Romans. The forms were very various—one of the most solemn consisting in the act of placing the hand on the altar of the deity who was invoked as witness. In the judicial proceedings of both the last-named nations, oaths were employed, but not universally; and in examples of their extrajudicial use, the literatures of both abound. In the Christian dispensation, the solemnity of an oath is enhanced by the elevated idea of the sanctity and perfection of the Deity.

The lawfulness and fitness of the practice, under circumstances of due solemnity, are commonly recognised by Christians. Some communions, of which the most remarkable are the Moravians and the Society of Friends, applying literally the words of Christ (Mat. v. 34), regard all oaths as unlawful. But other communions generally restrict this prohibition to ordinary and private discourse, and find in Rom. i. 2, 3 Cor. xi. 21, Gal. i. 20, Phil. i. 8, and 1 Thessal. ii. 5, full warrant for the lawfulness of oaths in judicial and other solemn use. From some passages of the Fathers, it might seem that they shared the difficulties of the Quakers and Moravians on the subject of the lawfulness of swearing; but these Fathers for the most part referred to the oaths required of Christians by the pagans, which generally involved a recognition of particular pagan divinities; and they condemned these pagan oaths, rather as involving or even directly containing a profession of the popular paganism, than as unlawful in themselves. The Christians of the later ages may perhaps be said to have multiplied in an opposite degree the occasions of oaths; especially of what were called "purgatorial" oaths, in which a party charged with a crime justified himself by swearing his innocence. These oaths were commonly accompanied by some imprecatory form or ceremonial, and were often expected to be followed by immediate manifestations of the divine vengeance upon the perjurer. The common instrument of attestation on oath was the Bible or some portion of it; but oaths were sometimes sworn on the relics of saints, or other sacred objects; sometimes simply by raising the hand to heaven, or by laying it upon the breast or the head. In canonical processes, the oath was often administered to the party kneeling. The forms varied very much; the most general being that which the English oath still retains (*Sic me Deus adjuvet*). Divines commonly require, in order to the lawfulness of an oath, three conditions (founded upon Jerem. iv. 2), viz., *truth, justice, and judgment*—that is to say (1), that the asseveration, if the oath be assertive, shall be true, and that the promise, if the oath be promissory, shall be made and shall be kept *in good faith*; (2), that the thing promised shall be objectively lawful and good; (3), that the oath shall not be sworn without due discretion and deliberation, and without satisfactory reasons founded on necessity, or at least on grave and manifest utility.

The Mohammedans do not employ oaths in their judicial proceedings; but they regard deliberate perjury, even when extrajudicially committed, as sinful, and deserving of God's vengeance. For this, however, they require that the oath should be an express adjuration of God himself by some one of his well-known holy names; that the jurant should be of full age and intelligence; and that the oath should be sworn deliberately, and with the intention of swearing.

OATH, in point of law, is that kind of solemn declaration which is necessary as a condition to the filling of some office more or less public, or of giving evidence in a court of justice. Nearly all the great public offices of the state in this country can only be filled by persons who are willing to take an oath before acting in such office. The most important office of all—that of king or queen of Great Britain—requires a Coronation Oath (q. v.). Members of parliament also require to take the

oath of fidelity and true allegiance, and promising to maintain the succession, in a full house, before taking their places (29 and 30 Vict. c. 19). Quakers and others may make an affirmation to the same effect. In 1368 and 1871, great changes were made as to oaths. The oath of allegiance and the official oath must now be taken by the great officers of state, such as the First Lord of the Treasury, Chancellor of the Exchequer, Lord Chancellor, Secretaries of State, &c., in England. In Scotland the same are taken by the Lord Keeper of the Great Seal and Privy Seal, Lord Clerk Register, Lord Advocate, and Lord Justice-Clerk; so in Ireland by the Lord Lieutenant, Lord Chancellor, and two others. The oath of allegiance and the judicial oath are taken by the superior judges in each kingdom, justices of the peace, and Scotch sheriffs. No others, except under the Clerical and Parliamentary Oaths Acts, are to take the oaths of allegiance, supremacy, and abjuration, or any oath substituted for these. All others who used formerly to take oaths now make declarations of fidelity in their office, and in some cases also one of secrecy.

The most important oaths affecting the general public are those which are required to enforce the truth from witnesses in courts of justice. It may be stated that jurymen, where they are called upon to exercise their functions, are also required to take an oath. The oath is read to the juror thus—"You shall well and truly try the issue between the parties, and a true verdict give, according to the evidence, so help you God;" and the juror kisses the new testament. Witnesses who are called to give evidence must all be first sworn in a similar manner, the words being, "The evidence you shall give shall be the truth, the whole truth, and nothing but the truth, so help you God." Hence, the person who is a witness must have sufficient understanding to know the nature and obligations of an oath; and on this ground, young children are incompetent to be witnesses. Another condition or qualification required in the party who takes an oath as a witness is, that he has a competent sense of religion, in other words, he must not only have some religious knowledge, but some religious belief. He must, in substance, believe in the existence of a God, and in the moral government of the world; and though he cannot be questioned minutely as to his particular religious opinions, yet, if it appear that he does not believe in a God and future state, he will not be allowed to give his evidence, for it is assumed, that without the religious sanction, his testimony cannot be relied upon. So long, however, as a witness appears to possess competent religious belief, the mere form of the oath is not material. The usual practice in England and Ireland is, for the witness, after hearing the oath repeated by the officer of court, to kiss the four gospels by way of assent; and in Scotland, the witness repeats similar words after the judge, standing and holding up his right hand, "swearing by Almighty God, as he shall answer to God at the Great Day of Judgment," but without kissing any book. Jews are sworn on the Pentateuch, keeping on their hats, and the oath ends with the words, "so help you Jehovah." A Mohammedan is sworn on the Koran; a Chinese witness has been sworn by kneeling and breaking a china saucer against the witness-box. Thus, the mere form of taking the oath is immaterial; the witness is allowed to take the oath in whatever form he considers most binding upon his own conscience—the essential thing being, however, that the witness acknowledge some binding effect derived from his belief in a God or a future state.

The policy of insisting upon the religious formalities attending the taking of an oath, has been much discussed of late years, and it has been disputed whether atheists, who avow an entire absence of all religious belief, should be entirely rejected as witnesses (as is sometimes the case), and justice be thereby frustrated. The objections of Quakers, Moravians, and Separatists to taking an oath have long been respected as not being fundamentally at variance with a due sense of religious feeling, and hence they have by statute been allowed to make an affirmation instead of taking the oath. In 1864 another concession was made to those who, not being Quakers, yet refuse to take the oath from sincere conscientious motives, and these are now also allowed to affirm instead of swear. But the law remains as before, that atheists and persons who admit that they have no religious belief whatever, are excluded from giving evidence in courts of justice.

When a witness, after being duly sworn, gives false evidence in a court of justice or in a judicial proceeding, and his evidence so falsely given is material, he commits the offence of *perjury*; but it is necessary, in England, not only that two witnesses

shall be able to prove the falsity of such evidence, but also that the party should be proceeded against, in the first instance, before a justice of the peace, or by order of a judge, or the attorney-general, it being found that frivolous and unfounded indictments were often preferred against witnesses by disappointed or hostile parties. As a general rule, perjury cannot be committed except in some judicial proceeding, or rather the giving of false evidence cannot be punished except it has been given in some judicial proceeding. The practice formerly existed of persons voluntarily taking oaths in various matters not connected with any judicial proceeding; and creditors often in this manner sought to add to other securities by insisting on a formal oath before a justice of the peace, in some isolated matter of fact. This practice was put an end to by the statute 5 and 6 Will. IV. c. 62, by which justices of the peace were prohibited from administering or receiving such oaths touching any matter or thing whereof such justice has not jurisdiction or cognizance by some statute. It is left to some extent to the discretion of the justice whether the particular matter is one as to which it is proper to administer an oath; but when it is considered proper, the declaration may be made in the form given by that statute; and if the party make a false declaration, he commits a misdemeanor. Unlawful oaths generally mean oaths taken by members of secret and illegal societies of a treasonable description; and statutes long ago passed to inflict penalties on all who took or administered such oaths.

**OATH OF CALUMNY**, in Scotch Law, means an oath taken by a party at the instance of his opponent, that the allegations were well founded. Oaths of verity and credulity are oaths that a debt or claim is well founded.

**OATHS, Military.** The taking of the oath of fidelity to government and obedience to superior officers was, among ancient armies, a very solemn affair. A whole corps took the oath together, sometimes an entire army. In modern times, when so many other checks are used for maintaining discipline, the oath has become little more than a form. In the United Kingdom, a recruit enlisting into the army or militia, or a volunteer enrolling himself, swears to be faithful to the sovereign, and obedient to all or any of his superior officers; also to divulge any facts coming to his knowledge which might affect the safety of his sovereign, or the stability of that sovereign's government. The members of a court-martial take an oath to try the cases brought before them justly, according to the evidence, to keep secret the finding until confirmed by the crown, and to keep secret always the opinions given by the members individually. The only other military oath is the common oath of a witness before a court-martial to tell the truth, the whole truth, and nothing but the truth.

**OB**, or **Obi**, the great river of Western Siberia, rises in two branches, the **Bia** and the **Katun** or **Katunga**, both of which have their origin in the **Altai Mountains**, within the frontier of the Chinese dominions, about lat. 49° n., and long. 90° e. These branches, flowing in a north-west direction, unite to form the **Ob** at the town of **Bilek** in lat. 59° 30' n., long. 85° e. Pursuing a winding course, with a general north-west direction, the **Ob** reaches the meridian of 75° e., when it turns west, and maintains that direction to its confluence with the **Irish**, the greatest of its tributaries. It then flows north-west, north, and north-east, to its mouth in the **Gulf of Ob**, which it reaches after a course of 2000 miles. Its chief affluents on the right are the **Tom**—a swifter stream than the **Ob**, 400 miles in length, and navigable for the last 230 miles from the beginning of May till July—the **Tchulim**, and the **Ket**. The principal affluent on the left is the **Irish**, which, rising within the frontier of the Chinese territories, traverses the **Altai Mountains**, and after a course longer than that of the **Ob** itself, joins that river 350 miles below **Tobolsk**. The trade of the **Irish**, of which the centre is **Tobolsk**, is important. The principal towns on the banks of the **Ob** are **Narim**, **Sargut**, **Berezow**, and **Obdorsk**.—The **Gulf of Ob** is a long inlet of the **Arctic Ocean**, 450 miles in length by about 100 miles in breadth. At present, only a few steamers ply on the great water-system of the **Ob**; but that system, commanding as it does between **Siberia**, the **Chinese territories**, and **European Russia**, is, without doubt, destined to become a great commercial thoroughfare. This river is one of the richest in fish, of all the rivers belonging to the **Russian empire**. Its waters are swelled in May by the melting of the snows of the plains, and again in June and July by the melting of the mountain snows. Below its junction with the

Irish, it divides itself into several parallel streams; and in the flood season it inundates great tracts of country, and presents the appearance of a waste of waters, its desolate uniformity broken only by the occasional tree-tops that rise above the surface. At Obdorsk, about 20 miles south of the southern border of the Gulf of Ob, the river freezes in the middle of October, and breaks up about the middle of May.

OBADI'AH, one of the "minor prophets" of the Old Testament, regarding whom absolutely nothing is known. His book or "vision"—the shortest of the Jewish Scriptures—appears, from internal evidence, to have been composed after the destruction of Jerusalem by the Chaldeans, 588 B.C., and consists of two parts. The first is a prophecy of the downfall of Edom. The second foretells the future redemption and glory of the house of Jacob, in which Edom—for his unbrotherly conduct—shall not share, but, on the contrary, be burned up as "stubble."

O'BAN, a parliamentary burgh and seaport, Argyshire, Scotland, on a bay of the same name, 20 miles (in direct line) north-west of Inveraray. The bay is protected from every wind by the island of Kerrera on the west, and by the high shores of the mainland, and is overlooked on the north by the picturesque ruins of Dunolly Castle. It is from 12 to 24 fathoms deep, and although the girdle of hills that seems to surround it gives it the appearance of a lake, it is easily accessible, and could afford anchorage to 300 sail. O. is the great rendezvous for tourists in the West Highlands. Its importance dates chiefly from the beginning of the present century. The burgh now contains a number of churches, several hotels and inns, schools, banks, &c. Within three miles of O. is Dunstaffnage Castle, which is said to have been the seat of the Scottish monarchy previously to its transference to Scone. The Stone of Destiny, which now supports the coronation chair in Westminster Abbey, and was carried thither from Scone by Edward I., was obtained, in the first instance, according to tradition, from Dunstaffnage Castle. Pop. of parliamentary burgh (which is one of the Ayr (q. v.) group) was 1940 in 1861; in 1871, 2426.

OBÊ, or Obi (etymology unknown), the name given to the magical arts or witchcraft practised by a class of persons among the negroes of the West Indies. The practitioner is called an *Obeah-man* or *Obeah-woman*. It differs in no essential respect from the corresponding superstitions all the world over. See MAGIC, WITCHCRAFT.

OBDIENCE, in Canon Law, means the duty by which the various gradations in ecclesiastical organisation are held subject, in all things consistent with the law of God or of the church, to the several superiors placed immediately above each, respectively, in the hierarchical scale. Thus priests and inferior clergy owe canonical obedience to the bishop, and priests are bound thereto by a solemn promise administered at ordination. The bishop primitively took a similar oath to the metropolitan; but by the modern law, the jurisdiction of the metropolitan is confined to the occasions of his holding a visitation, or presiding in the provincial synod. Bishops, by the present law of the Roman Catholic Church, take an oath of obedience to the pope. This obedience, however, is strictly limited by the canons, and is only held to bind in things consistent with the divine and natural law. In ecclesiastical history the word Obedience has a special signification, and is applied to the several parties in the church, which, during the great Western Schism (q. v.), adhered to the rival popes. Thus we read of the "Roman Obedience," which included all who recognised the pope chosen at Rome, and the "Avignon Obedience," which meant the supporters of the Avignon pope. So, again, historians speak of "the Obedience of Gregory XII.," and "the Obedience of Benedict XIII.," &c. Applied to the monastic institute, obedience means the voluntary submission which all members of religious orders vow, at the religious profession, to their immediate superiors, of whatever grade in the order, as well as to the superior general, and still more to the rules and constitutions of the order. This forms in all orders one of the essential vows. It is, however, expressly confined to lawful things; and although it is held that a superior can command certain things under pain of sin, yet Roman Catholics repudiate the notion that the command of a superior can render lawful, much less good, a thing which is of its own nature, or by the law of God, sinful or bad. The name Obedience is sometimes given to the written precept or other formal instrument by which a superior in a religious order communicates to one of his subjects any special precept or instruction—as, for example, to undertake a certain office, to proceed upon a particular mission, to relinquish a certain appointment, &c. The

instruction, or the instrument containing it, is called an obediencce, because it is held to bind in virtue of religious obedience.

O'BELISK, a word derived from the Greek *obelos* and *obeliskos*, signifying a spit, applied to prismatic monuments of stone and other materials, terminating with a pyramidal or pointed top. These monuments, called *tekhen*, were placed upon bases before gateways of the principal temples in Egypt, one on each side of the door. They served in Egyptian art for the same purposes as the stelæ of the Greeks and columns of the Romans, and appear to have been erected to record the honors or triumphs of the monarch. They have four faces, are cut out of one piece, and are broader at the base than at the top, at a short distance from which the sides form the base of a pyramidion in which the obelisk terminates. They were placed upon a cubical base of the same material, which slightly surpassed the breadth of their base. Each side of the obelisk at the base measures 1-10th of the height of the shaft, from the base line to that where the cap, or pyramidion commences. The cap is also 1-10th of the same height. Their sides are slightly concave, to increase their apparent height. Their height varies from upwards of 100 feet to 165 feet 7 inches, the tallest known being that of Karnak, which rises to 165 feet 7 inches. The sides are generally sculptured with hieroglyphs and representations, recording the names and titles of kings, generally in one line of deeply-cut hieroglyphs down each side. The pyramid of obelisks was sometimes decorated with subjects. The mode by which they were made appears to have been to hew them first in the rough out of a solid piece in the quarries, and one unfinished specimen thus prepared still remains in the quarries of Syene. They were transported down the Nile during the inundation, on rafts to the spot where they were intended to be placed, and raised from their horizontal position by inclined planes, aided by machinery. Some obelisks, before their erection, had their pyramid capped with bronze gilded, or gold, the marks of such covering still being evident on their surfaces. Under the Roman empire, they were raised by pulleys and heavy tackle. The difficulty of erecting the fallen ones in the ages of the renaissance, as also the mechanical appliances for the lowering from its original site the obelisk of Luxor in 1831, and erecting it in the Place de la Concorde in 1833 by Le Bas, shew the difficulties experienced by the ancients. The use of obelisks is as old as the appearance of art itself in Egypt; these grand, simple, and geometric forms being used in the 4th dynasty, and continued till the time of the Romans. Their object is enveloped in great obscurity. At the time of the 19th dynasty, it appears that religious ceremonies and oblations were offered to the obelisks, which were treated as divinities. Their sepulchral use is evinced by their discovery in the tombs of the 4th dynasty, and the vignettes of early papyrus. No large obelisk is older than that of Matarieh or Heliopolis, erected by Osortesen I. about 1900 B.C.; and that of Beggig or Crocodilopolis is, in reality, only a stela. Thothmes I. placed two of large size before the granite sanctuary of Karnak, and his daughter Hatsen, two others of above 90 feet high, before the second propylæon. Additional sculptures were made on these obelisks by Sethos I., who restored them. Thothmes III. appears to have erected many obelisks. The oldest is that of the Atmetan or Hippodrome of Constantinople, erected to record his conquest of Nubiana or Mesopotamia. Two others, which formerly stood at Heliopolis, were subsequently re-erected by Rameses II. at Alexandria. One of these still remains erect, and is popularly known as Cleopatra's Needle, the other lies prostrate. Both have greatly suffered from the effects of sea breezes. The highest of all obelisks, that of St John of the Lateran, appears to have been removed from Thebes, and set up by Thothmes IV. 35 years after the death of Thothmes III. A small obelisk of Amenophis II. said to have been found in the Thebaid, apparently from Elephantine, is in the collection of the Duke of Northumberland at Sion. Sethos I. commenced the Flaminian obelisk, subsequently completed by Rameses II., and placed at the temple of Heliopolis. It was removed to Rome by Constantius, and found 16 feet under the surface in the pontificate of Gregory XIII., and erected in that of Sextus V. by the architect Fontana. The other obelisks of Rameses II. are, the one at the Luxor quarter of Thebes, the companion of which was removed to the Place de la Concorde at Paris in 1833; the two obelisks of San or Taulis; that of the Boboli Gardens of Florence, transported from the circus of Flora at Rome; the

obelisk of the Rotonda at Rome, erected by Clement XII., 1711 A.D.; and that of the Villa Mattei, which decorated the Ara Cæli of the Capitol. A fragment of another obelisk was in the Collegio Romano. No obelisks are known of other monarchs till the 26th dynasty. That of the Monte Citorio at Rome, erected by Ptolemy Philadelphus II. at Heliopolis, was transported by Augustus to the Campus Martius, having been exhumed 1748 A.D., and erected by the architect Antinori in that of Pius VI. Two other obelisks of small size, made of black basalt, dedicated by Nectanebe II. or Nectanebes II. at Hermopolis, commonly known as the obelisks of Calvo, are in the British Museum. Ptolemy Philadelphus is said to have erected in the Arsinoeum at Alexandria a plain obelisk of 80 cubits, cut in the quarries by Nectanebes. It was set up by the architect Satyrus. Two obelisks, erected by Ptolemy Euergetes II. and his wife Cleopatra, stood before the temple of Philæ, one of which was removed to Corte Castle by Mr. Banks. The so-called Pamphiliano obelisk at Rome, erected by E. Bernini in 1651, in the Piazza Navona, under the pontificate of Innocent X., was removed from the Circus of Maxentius, having, as their hieroglyphical legends testify, been originally erected by Domitian before the Serapeum at Rome. The last of the Roman obelisks was the Barberini, which was found in 1633 on the site of the Circus of Aurelian, and finally erected in 1822 on the Monte Pincio. It was placed by the Emperor Hadrian before the mausoleum or cenotaph either of himself or Antinous, between 132—138 A.D. Barbarous hieroglyphs, found on the Sallustian obelisk, are copied from the Flaminian obelisk. It is supposed to have been transported to Rome, unadorned with hieroglyphs, by Sallustius Crispus, prefect of Numidia, and to have been set up in the gardens of Sallust, in the reign of Vespasian. It was erected by Antinori, 1789, before the Church of Trinità del Monte. It has been seen how, on the renaissance of the arts, the obelisks were restored and applied to the embellishments of modern Rome, either as columns in the centres of piazzas or squares, or else as the ornaments of fountains; one obelisk being set up alone in the centre of the piazzas and places of Italy and France, while in antiquity they always stood in pairs before the Pylons.

Two small obelisks, and the apex of a third, have been found in Assyria, in shape of truncated prisms, the apices step-shaped. The most interesting is that of the north-west palace of Nimrod, of black marble, is 5 feet 9 inches high. Each side has five compartments of bas-reliefs, representing the tribute and offerings made to the Sinalmanaser. It is covered with a cuneiform inscription, recording the annals of the king's reign, from his 1st to his 31st year. On it is represented the tribute of Jehu, king of Israel. A second obelisk, of white marble, measures 8 feet 2 inches high, is covered with bas-reliefs, representing scenes of war and tributes, winding round it like those of a Roman triumphal column. On it is an inscription of Sarnas-Pul. The broken apex of the third has a dedication from Ashur-izir-pul II. An obelisk of Semiramis at Babylon is mentioned by Diodorus, and another of Aricarnus was interpreted by Democritus. Under the Roman empire, obelisks were used as gnomons, placed in the public spaces, or erected in the *spina* of the *circi*. The first removal of obelisks to Rome took place in the reign of Augustus, who placed one in the circus, said to have been originally erected in the reign of Semeuperteus, 86½ feet high; and another of 9 feet less, in the Campus Martius, and had it adjusted as a gnomon by the mathematician Facundus Novus; a third obelisk was erected in the Circus of Caligula and Nero in the Vatican, and originally dedicated to the sun by Nuncoreus, the son of Sesosis, on the recovery of his sight. Two other small obelisks, which decorated the mausoleum of Augustus, and were erected by Claudius or Vespasian and his sons, have been found. Other obelisks are known to have been removed by Constantius, 354 A.D. P. Yener, in his description of the quarters of ancient Rome, reckons 6 of the largest and 42 others. The Romans added to them brazen spheres and other decorations. Some were removed to Constantinople by Theodosius the younger, and Valentinian, 390 A.D. The translation of the inscription of one of the Roman obelisks made by a Greek or Egyptian, named Hermaphion, has been preserved by Ammianus Marcellinus.—Kircher, "Œdipus Ægyptiacus" (tom. iii. Rom. 1652—1654); Zoega, "De Origine et Usu Obeliscorum" (fo. Rom. 1797); Cipriani, "Sui Dodici Obelisci di Roma" (fo. Rom. 1823); L'Hôte, "Notice Historique sur les Obélisques Égyptiens" (8vo, Paris, 1836); Birch, "Notes upon Obelisks, in the Museum of Classical Antiquities" (8vo, Lond. 1838), pp. 208—

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239; Layard, "Nineveh and its Remains," vol. i. p. 346; Sir H. Rawlinson, "A Commentary on the Cuneiform Inscriptions" (2mo, Lond. 1850).

OBERLIN, Johann Friedrich, distinguished for his active benevolence and usefulness, was born at Strasburg, 31st August 1740; and in 1766 became Protestant pastor of Waldbach, in the Ban de la Roche or Steinthal, a wild mountainous district of Alsace. Here he spent the remainder of his life, combining an affectionate diligence in the ordinary duties of the pastorate, with wise and earnest endeavors to promote the education and general prosperity of the people. The district had suffered terribly in the Thirty Years' War, and the scanty population which remained was sunk in poverty and ignorance. O. introduced better methods of cultivating the soil, and various branches of manufacture. The population, which was scarcely 500 when he entered on his labors, had increased to 5000 at the close of the century. Yet, though animated in all his actions by the most pure and disinterested piety, it may be questioned if he did not carry his moral supervision too far when he kept a register of the moral character of his parishioners, and searched with the minutiae though not the motives of an inquisitor, into the most insignificant details of their private life. O. was ably assisted in his reformatory labors by his pious house-keeper, Louise Schepler, who survived her master eleven years. He died 1st June 1826. Notwithstanding the humble sphere in which his days were spent, his fame as a philanthropist has extended over the world, and his example has stimulated and guided many. See "Brief Memorials of Oberlin," by the Rev T. Sims, M.A. (Lond. 1830), and also "Memoirs of Oberlin, with a short notice of Louisa Schepler" (Lond. 1838 and 1852).

OBERON, the king of the Elves or Fairies, and the husband of Titania. The name is derived by a change of spelling from *Auberon*, more anciently *Alberon*, and that from the German *Alberich*, i. e., king of the Elves. O. is first mentioned as "Roi du royaume de la féeerie" in the old French poem of "Huon de Bordeaux, pair de France," which was afterwards made the basis of a popular prose romance. From the French, O. was borrowed by the English poets, Chaucer, Spenser, and others, but he is most familiarly known from his appearance in Shakespeare's "Midsummer Night's Dream." From old French sources, also, Wieland derived part of the materials of his poem of "Oberon."

OBE'SITY, or Corpulence, may be defined to be "an accumulation of fat under the integuments or in the abdomen, or in both situations, to such an amount as to embarrass the several voluntary functions." A certain degree of fatness is not only quite compatible with health, but, as has been shewn in the article *FAT*, ANIMAL, the fatty tissue is of considerable use in the animal body, partly in consequence of its physical, and partly in consequence of its chemical properties; and it is only when the fatness begins to interfere with the discharge of any of the vital powers, that it can be regarded as a morbid condition. Obesity may occur at any period of life, but it is most commonly after the fortieth year that the tendency to an inordinate accumulation of fat begins to shew itself. After that time, in the case of men, the pleasures of the table are usually more attractive than in earlier life, and much less muscular exercise is taken; while in women, the cessation of the power of child-bearing induces changes which tend remarkably to the deposition of fat. The extent to which fat may accumulate in the human body is enormous. Daniel Lambert, who died at the age of forty years, weighed 739 lbs.; his exact height is not recorded, but, according to the investigations of the late Dr Hutchinson (the inventor of the spirometer), the normal weight of a man six feet high should not exceed 178 lbs. Dr Elliotson has recorded the case of a female child, a year old, who weighed 60 lbs; and those who are interested in the subject will find a large collection of cases of obesity in Wadd's "Curious Remarks on Corpulence."

The predisposing causes of obesity are a peculiar habit of body, hereditarily transmitted; inactivity; sedentary occupations, &c.; while the more immediate or exciting causes are a rich diet, including fatty matters, and matters convertible in the body into fats, such as saccharine and starchy foods, and the partaking of such a diet to a greater extent than is necessary for balancing the daily waste of the tissues. "Fat meats, butter, oily vegetable substances, milk, saccharine and farinaceous substances are the most fattening articles of food; whilst malt liquors, particularly rich

and sweet ale are, of all beverages, the most conducive in promoting obesity. The fattening effect of figs and grapes, and of the sugar-cane, upon the natives of the countries where these are abundant, is well known. In various countries in Africa and the East, where obesity is much admired in females, warm baths, indolence, and living upon saccharine and farinaceous articles, upon dates, the nuts from which palm-oil is obtained, and upon various oily seeds, are the means usually employed to produce this effect."—Copland's "Dictionary of Medicine," article "Obesity." The knowledge of the means of inducing obesity affords us the best clue to the rational treatment of this affection. It is a popular belief that the administration of acids—vinegar, for example, or one of the mineral acids—will check the deposition of fat; but if the desired effect is produced, it is only at the cost of serious injury to the digestive, and often to the urinary organs. The employment of soap and alkalis, as advocated a century ago by Dr Flemming ("A Discourse on the Nature, Causes, and Cure of Corpulency," 1760), is less objectionable than that of acids, but the prolonged use even of these is usually prejudicial. The efficacy of one of our commonest sea-weeds, sea-wrack (*Fucus vesiculosus*), in this affection has also been strongly advocated. It is prescribed in the form of an extract, and its value is probably dependent on the iodine contained in it.

A very interesting "Letter on Corpulence," published in 1863 by Mr Banting, in which he records the effect of diet in his own case, after all medicinal treatment had failed, is well worthy of the attention of those who are suffering from the affection of which this article treats. The following are the leading points in his case. He was 66 years of age, about 5 feet 5 inches in stature (and therefore, according to Dr Hutchinson's calculations, ought to have weighed 142 lbs.), and in August 1862 weighed 202 lbs. "Few men," he observes, "have led a more active life . . . so that my corpulence and subsequent obesity were not through neglect of necessary bodily activity, nor from excessive eating, drinking, or self-indulgence of any kind, except that I partook of the simple aliments of bread, milk, butter, beer, sugar, and potatoes, more freely than my aged nature required. . . . I could not stoop to tie my shoe, nor attend to the little offices humanity requires without considerable pain and difficulty; I have been compelled to go down stairs slowly backwards, to save the jar of increased weight upon the ankle and knee joints, and been obliged to puff and blow with every slight exertion" (pp. 10 and 14).

By the advice of a medical friend, he adopted the following plan of diet: "For breakfast I take four or five ounces of beef, mutton, kidneys, broiled fish, bacon, or cold meat of any kind except pork; a large cup of tea (without milk or sugar), a little biscuit, or one ounce of dry toast. For dinner, five or six ounces of any fish except salmon, any meat except pork, any vegetable except potato, one ounce of dry toast, fruit out of a pudding, any kind of poultry or game, and two or three glasses of good claret, sherry, or Madeira; champagne, port, and beer forbidden. For tea, two or three ounces of fruit, a rusk or two, and a cup of tea without milk or sugar. For supper, three or four ounces of meat or fish, similar to dinner, with a glass or two of claret (p. 18). I breakfast between eight and nine o'clock; dine between one and two; take my slight tea meal between five and six; and sup at nine" (p. 40). Under this treatment he lost in little more than a year (between the 26th of August 1862 and the 12th of September 1863) 46 lbs. of his bodily weight, while his girth round the waist was reduced 12½ inches. He reported himself as restored to health, as able to walk up and down stairs like other men; to stoop with ease and freedom; and safely to leave off knee-bandages, which he had necessarily worn for twenty years past. He made his own case widely known by the circulation of his pamphlet (which has passed through several editions); and "numerous reports sent with thanks by strangers as well as friends," shew that (to use his own words) "the system is a great success;" and that it is so we do not doubt, for it is based on sound physiological principles.

O'BIT (Lat. *obitus*, a "going down," "death"), literally means the decease of an individual. But as a certain ecclesiastical service was fixed to be celebrated on the day of death (*in die obitus*), the name came to be applied to the service itself. Obit therefore signifies, in old church language, the service performed for the departed. It consisted, in the Roman Church, of those portions of the *Officium Defunctorum* which are called Matins and Lauds, followed by a Mass of the Dead, chanted, or occasionally read. Similar services are held on the day of the funeral, and on the 30th



day, and the anniversary; and although the name obit was primitively applied only to the first, it has come to be used of them all indiscriminately.

**OBJECT**, in the language of Metaphysics, is that of which any thinking being or *Subject* can become cognizant. This subject itself, however, is capable of transmutation into an Object, for one may think about his thinking faculty. To constitute a metaphysical object, actual existence is not necessary; it is enough that it is conceived by the subject. Nevertheless, it is customary to employ the term objective as synonymous with real, so that a thing is said to be "objectively" considered when regarded in itself, and according to its nature and properties, and to be "subjectively" considered, when it is presented in its relation to us, or as it shapes itself in our apprehension. Scepticism denies the possibility of objective knowledge; i.e., it denies that we can ever become certain that our cognition of an object corresponds with the actual nature of that object. The verbal antithesis of objective and subjective representation is also largely employed in the fine arts, but even here, though the terms may be convenient, the difference expressed by them is only one of degree, and not of kind. When a poem or a novel, for example, obtrudes the peculiar genius of the author at the expense of a clear and distinct representation of the incident and character appropriate to itself, we say it is a subjective work; when, on the contrary, the personality of the author retires into the background, or disappears altogether, we call it objective. The poems of Shelley and Byron; the novels of Jean Paul Richter, Bulwer Lytton, and Victor Hugo; and the paintings of the Pre-Raphaelites belong essentially to the former class; the dramas of Shakspeare, the novels of Scott, and the poems of Goethe, to the latter.

**OBJECT-GLASS**, the glass in a Telescope (q. v.) or Microscope (q. v.), which is placed at the end of the tube nearest the object, and first receives the rays of light reflected from it.

**O'BLATES** (Lat. *oblatus*, *oblata*, "offered up"), the name of a class of religious bodies in the Roman Catholic Church, which differ from the religious orders strictly so called, in not being bound by the solemn vows of the religious profession. The Institute of oblates was one of the many reforms introduced in the diocese of Milan by St Charles Borromeo, towards the close of the 16th century. The members consisted of secular priests who lived in community, and were merely bound by a promise to the bishop to devote themselves to any service which he should consider desirable for the interest of religion. St Charles made use of their services chiefly in the wild and inaccessible Alpine districts of his diocese. This institute still exists, and has been recently introduced into England. Still more modern are the "Oblates of the blessed Virgin Mary," a body of French origin, which arose in the present century, and has been very widely extended; and whose chief object is to assist the parochial clergy, by holding missions for the religious instruction of the people in any district to which they may be invited. This body also has been established in England and in Ireland. Other similar institutes might be enumerated, but the constitution of all is nearly the same. There is also a female institute of oblates, which was established in Rome, about 1440, by St Francisca of Rome, and which consists of ladies associated for charitable and religious objects, and living in community, but bound only by promise, and not by vow.

**OBLIGATION** is a term used in Scotch Law to denote the binding effect of any legal contract, and is often used synonymously with contract or promise. An obligation is said to be pure when it may be instantly demanded (called in England an absolute contract). An obligation is conditional when it depends, for its legal effect, on some event which may or may not happen. Obligations are also divided into verbal and written.

**OBLIGATO**, in Music. When a musical composition is constructed in more than one part, any part is said to be obligato which is not merely employed to strengthen the others, but is necessary to the melodic perfection of the whole. An accompaniment is said to be obligato which does not consist of mere chords, but has its own melody.

**O'BOE**. See **HAUTBOY**.

**O'BOLUS** (Gr. *obolos* or *obelos*, a spit), the smallest of the four common Greek

coins and weights, was originally, as is generally supposed, a small piece of iron or copper, similar in form to the head of a spit, or spear head, whence its name. In this form it was used as a coin, and a handful of "oboli" was equivalent to a Drachma (q. v.). It was subsequently coined of silver, and in the ordinary round form, but still retained its original name; its value, both as a coin and a weight, was now fixed as the 1-6th part of a drachma, so that in the Attic system it was equivalent to 1½d. and 15 2-5 Troy grains respectively; while the Æginetan obolus was worth 2½d. as a coin, and 25½ Troy grains as a weight. Multiples and submultiples of this coin were also used, and pieces of the value of 5, 4, 3, 2, 1½ oboli, and of ½, ¼, and ⅛ of an obolus respectively, are to be found in collections of coins.

O'BRIEN, William Smith, born in 1803, was the second son of the late Sir Edward O'Brien, Bart. of Dromoland, in the county of Clare, Ireland, and uncle of the present Lord Inchiquin; that ancient barony having recently passed to the Dromoland O'Briens on the failure of the elder branch. W. S. O. was educated at Harrow School, whence he passed to Trinity College, Cambridge. He entered parliament for the borough of Ennis in 1826, and was a warm supporter of Catholic emancipation. In 1835, he was returned on advanced liberal principles for the county of Limerick, and for several years strongly advocated the claims of Ireland to a strictly equal justice with England, in legislative as well as executive measures. Professing his inability to effect this in the united legislature, and having embroiled himself with the Speaker by refusing to serve on committees (for which refusal he was committed to prison in the House by the Speaker's order), he withdrew from attendance in parliament in 1841, and joined actively with Daniel O'Connell (q. v.) in the agitation for a repeal of the legislative union between England and Ireland. In the progress of that agitation, a division having arisen on the question of *moral* as against *physical* force between O'Connell and the party known as "Young Ireland," O. sided with the latter; and when the political crisis of 1848 eventuated in a recourse to arms, he took part in an attempt at rebellion in the south of Ireland, which in a few days came to an almost ludicrous conclusion. He was in consequence arrested, and having been convicted, was sentenced to death. The sentence, however, was commuted to transportation for life; and after the restoration of tranquillity in the public mind in Ireland, he, in common with the other political exiles, was permitted to return to his native country. From that date (1856) he spent much of his time in foreign travel; and although he wrote more than once in terms of strong disapproval of the existing state of things, he invariably abstained from all active share in the political proceedings of any party. He died June 1864.

OBSCENE PRINTS, Books or Pictures, exhibited in public render the person so doing liable to be indicted for a misdemeanor. Persons exposing them in streets, roads, or public places, are also liable to be punished as rogues and vagabonds with hard labor. An important change in the law was effected by Lord Campbell's Act (30 and 31 Vict. c. 83), which was passed to suppress the traffic in obscene books, pictures, prints, and other articles. Any two justices of the peace, or any police magistrate, upon complaint made before him on oath that such books, &c., are kept in any house, shop, room, or other place, for the purpose of sale, or distribution, or exhibition for gain or on hire, and that such things have been sold, &c., may authorise a constable to enter in the daytime, and, if necessary, use force by breaking open doors, or otherwise to search for and seize such books, &c., and carry them before the magistrate or justices, who may, after giving due notice to the occupier of the house, and being satisfied as to the nature and object of keeping the articles, cause them to be destroyed.

OBSCURANTISTS, the name given, originally in derision, to a party who are supposed to look with dislike and apprehension on the progress of knowledge, and to regard its general diffusion among men, taken as they are ordinarily found, as prejudicial to their religious welfare, and possibly injurious to their material interests. Of those who avow such a doctrine, and have written to explain and defend it, it is only just to say that they profess earnestly to desire the progress of all true knowledge as a thing good in itself; but they regard the attempt to diffuse it among

men, indiscriminately, as perilous, and often hurtful, by producing presumption and discontent. They profess but to reduce to practice the motto—

A little learning is a dangerous thing.

It cannot be doubted, however, that there are fanatics of ignorance as well as fanatics of science.

**OBSE'RVANTISTS**, or Observant Franciscans. Under the head **FRANCISCANS** (q. v.) has been detailed the earlier history of the controversies in that order on the interpretation of the original rule and practice established by St. Francis for the brethren, and of the separate organisation of the two parties at the time of Leo X. The advocates of the primitive rigor were called *Observantes*, or *Stricteris Observantia*, but both bodies were still reputed subject, although each free to practise its own rule in its own separate houses, to the general administrator of the order, who, as the rigorists were by far the more numerous, was a member of that school. By degrees, a second reform arose among a party in the order, whose zeal the rigor of the O. was insufficient to satisfy, and Clement VII. permitted two Spanish friars, Stephen Molina and Martin Guzman, to carry out in Spain these views in a distinct branch of the order, who take the name of *Reformati*, or *Reformed*. This body has in later times been incorporated with the O. under one head. Before the French Revolution, they are said to have numbered above 70,000, distributed over more than 3000 convents. Since that time, their number has, of course, been much diminished; but they still are a very numerous and widespread body, as well in Europe as in the New World, and in the missionary districts of the East. In Ireland and England, and for a considerable time in Scotland, they maintained themselves throughout all the rigor of the penal times. Several communities are still found in the two first-named kingdoms.

**OBSERVATION AND EXPERIMENT** are the leading features of modern science, as contrasted with the philosophy of the ancients. They are indispensable as the bases of all human knowledge, and no true philosophy has ever made progress without them, either consciously or unconsciously exercised. Thus, by Socrates, Plato, and Aristotle, no less than by Archimedes and the ancient astronomers, observation and experiment are extensively though not prominently or always obviously employed; and it was by losing this clue to the spirit of their masters' teaching, that the later disciples in these schools of philosophy missed the path of real progress in the advancement of knowledge. It was in the latter half of the 16th c. that the minds of philosophers were first *consciously* awakened to the importance of observation and experiment, as opposed to authority and abstract reasoning. This result was first occasioned by the discoveries and controversies of Galileo in Florence; and to the same end were contributed the simultaneous efforts of a number of philosophers whose minds were turned in the same direction—Tycho Brahe in Holland, Kepler in Germany, William Gilbert in England, who were shortly afterwards followed by a crowd of kindred spirits. The powerful mind of Francis Bacon lent itself to describe the newly-awakened spirit of scientific investigation, and though he ignored or affected to despise the results achieved by the great philosophers just mentioned, he learned from them enough to lay the foundation of a philosophy of inductive science, which, if we look at the course of scientific progress since his day, seems to have been almost prophetic. The difference between observation and experiment may be said to consist in this, that by observation we note and record the phenomena of nature as they are presented to us in her ordinary course; whereas by experiment we note phenomena presented under circumstances artificially arranged for the purpose. Experiment is thus the more powerful engine for discovery, since one judiciously conducted experiment may provide the data which could only result from a long course of observations.

**OBSERVATORY**, an institution supplied with instruments for the regular observation of natural phenomena, whether astronomical, meteorological, or magnetical. In some observatories all three classes of observation are carried on, but in most cases special attention is paid to astronomy alone, and only such meteorological observations are taken as are required for the calculation of the effect of atmospheric refraction on the position of a heavenly body; there are, however, a few observatories which are devoted solely to meteorological or magnetical observations.

Confining our attention to astronomical observatories, it will be convenient to divide them into two classes—public and private observatories—the former being devoted to those observations which from their nature require to be continued on the same system for long periods of time, whilst the latter are usually founded for some special object, which may be attained with a comparatively small expenditure of time and labor.

The most important work which is carried out in public observatories is the determination of the movements of the sun, moon, and planets among the stars; and, as a corollary to this, the relative positions of the stars to which the other heavenly bodies are referred. In early times the Greek astronomers fixed these positions by means of armillary spheres and astrolabes, having concentric graduated circles, on which the latitudes and longitudes could be read off, when a pair of sights was pointed to the heavenly body. Ptolemy made use of a quadrant, with which he measured zenith distances on the meridian; and many centuries after, Tycho Brahé converted this form of instrument into an alidzimuth by mounting it on a vertical axis in connection with a horizontal or azimuth circle. With this instrument Tycho Brahé made a long series of observations of the altitudes and azimuths of the heavenly bodies at the observatory which the king of Denmark erected for him, and he also measured with great assiduity their angular distances from each other by means of a sextant, a method of observation which Flamsteed afterwards employed with a much improved form of the instrument, and which is now extensively used with the reflecting sextant, for finding the longitude at sea. It was not till the middle of the last century that the improvement of the clock by Graham enabled astronomers to rely on it for the determination of right ascensions by the times of passage across the meridian, instead of by measuring them with a graduated circle. The quadrant was then fixed in the meridian, and being attached to a massive wall, its dimensions were increased, and greater accuracy thereby secured in the determination of meridian zenith distances. Two such instruments pointing respectively north and south were erected at the Royal Observatory, Greenwich, and used by Bradley and his successors from 1750 till they were displaced by the mural circle (see CIRCLE, MURAL), an instrument vastly superior in principle, since the troublesome errors of centring of the quadrant were got rid of by combining the readings of opposite parts of a graduated circle, whilst the effect of division errors was much reduced by taking the mean of the readings at six or eight equidistant points of the circle. At the same time, the accuracy of the readings was greatly increased by the invention of the micrometer-microscope, which made it possible to measure spaces to 1-100,000 of an inch. Neither the quadrant nor the mural circle, however, could be relied upon for accurate motion in the plane of the meridian, but Römer remedied this defect by inventing a separate instrument, the Transit (q. v.), which enabled astronomers to observe the times of meridian passage or transit with great accuracy, and thus to determine the differences of right ascension of the heavenly bodies by means of the apparent diurnal movement. With the transit and quadrant Bradley commenced that series of observations of the positions of the sun, moon, and planets, and of stars for reference, which have been continued ever since at Greenwich, and on which, in combination with less extensive series at Paris and Königsberg, all our tables of the motions of the heavenly bodies are founded. In modern observatories, the transit and mural circle are combined into one instrument, the transit-circle, a change which has been rendered possible chiefly by the improvement in graduated circles since the invention of Troughton's dividing engine, the unwieldy size of the old quadrants and mural circles necessitating an attachment to a massive wall. Although Reichenbach made transit-circles at the beginning of this century for several foreign observatories, including that of Dorpat, the lightness of their structure and their want of stability prevented their being introduced generally, and the mural circle held its place in the principal observatories till Sir George Airy designed the Greenwich transit-circle in 1851, an instrument of a most massive character, which has served as model for nearly all that have been constructed in recent years. The main features of the modern transit-circle are: (1) that it is not reversible, its collimation error being determined by means of two collimators, or reversed telescopes pointing at each other and at the transit telescope, north and south respectively; (2) that a spirit-level is not used, the level error being found by means of the reflection of the wires from the horizontal surface of mercury. These two negative characteristics, while admitting of great

Obsidian  
Occam

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massiveness in construction (the Greenwich instrument weighs more than a ton), have removed three troublesome sources of error—inequality in the pivots, lateral flexure of the telescope in the process of reversion, and the effects of currents of heated air on a spirit-level. An important auxiliary to the transit-circle is the chronograph, an American invention, which, in various forms, is now found in all well-equipped observatories, the principle in all cases being the same—viz., the registration on a revolving cylinder of paper of the times of transit across the system of spider-lines of the transit-circle, as well as of the seconds of the sidereal clock, by means of electric currents, which pass through electro-magnets, when the circuit is closed either by the observer or the clock, thus causing a momentary attraction of a piece of soft iron, and producing a corresponding mark on the paper either with a pen or a steel point. This system, while improving somewhat the accuracy of the individual observations, admits of a large number being made at intervals of two or three seconds, and leaves the observer free to make several observations of zenith distance during the passage of a star across the field of view. Allusion has been made to the importance of the sidereal clock in modern astronomy. Considerable improvements have been made in its construction since Graham's times, the original gridiron pendulum having been replaced successively by the mercurial and the zinc and steel, and the dead-beat escapement by Dennison's gravity and Alry's detached escapement. Recently an apparatus depending on the attraction of a movable magnet connected with a float in a syphon barometer has been applied by Sir George Alry to the sidereal clock at Greenwich, to correct for the effect of variations in the atmospheric pressure on the motion of the pendulum. This clock is placed in a basement which is kept at a nearly uniform temperature, an important condition, which has contributed to make its performance very far superior to that of any other clock hitherto constructed, and fully equal to the requirements of the methods of observation now in use. With instruments such as have just been described, regular observations of the sun, moon, and planets, and of fundamental stars, are made at Greenwich, Paris, Washington, and Oxford, supplemented at the first-named observatory by extra-meridian observations of the moon with a massive altazimuth, which can be employed when the moon is too near new moon to be seen on the meridian in full daylight, and which is in fact used to secure an observation on every night when the moon is visible. The observations of stars at these four observatories are directed to the most accurate determination of the places of a limited number, and the deduction of their proper motions by comparison with the results obtained by Bradley, Piazzi (with an altazimuth by Ramsden at Palermo), and Groombridge; but at other observatories differential or zone observations of large numbers of stars have been made, with the object of making a complete and tolerably accurate survey of the heavens, the rhomb or ring micrometer being used for this purpose. Among those who have devoted themselves to this work may be mentioned Lacaille at the Cape of Good Hope, Lalande at Paris, Bessel at Königsberg, and Argelauder at Bonn. These zone-observations are now being repeated with the transit-circle at a number of observatories, associated together for the purpose of getting far more accurate places than was possible with the equatorial. A large number of observatories, chiefly in Germany and America, are devoted to a very different class of observations—viz., differential observations with the Equatorial (q. v.) of comets and small planets as referred to comparison-stars, and the search for such objects; whilst at other observatories, among which that of Pulikowa may be mentioned, the measurement of double stars with the micrometer is laid down as the chief object. Of late years two new subjects have been introduced in the routine of observatory work—photography and spectroscopy. The former was carried on for many years at Kew Observatory under Mr De La Rue's auspices, and at his private observatory at Cranford, and the work is now being continued at Greenwich; the latter has been taken up at a number of Italian observatories, and particularly at Rome by P. Secchi, and it now forms part of the regular system at Greenwich; whilst the observatories at Paris, Berlin, and Vienna are equipped for these physical observations, and in America and Australia they are vigorously carried on at several observatories—Melbourne, in particular, being provided with a four-foot equatorial reflector for this purpose, as well as for the examination of nebulae. The most important work of an observatory, however, consists, not in

making observations which are easily multiplied, but in reducing and publishing them—a task of far greater labor, and requiring far higher qualifications. However various may be the observations, the method of eliminating their errors is the same in all cases, and similar mathematical considerations apply to their reduction, whether they be meridian observations, micrometer measures, measures of photographs, or spectroscopic observations; and it is when such treatment is required in any inquiry that it should be undertaken at a public observatory, where this rigorous method will be applied.

The work of private observatories hardly admits of being specified, though its general character has already been indicated; it may suffice to mention the observations of double stars and nebulae by the two Herschels, Groombridge's catalogue of circum-polar stars, Smyth's double-star measures, Carrington's R. d. III catalogue and solar observations, the nebular observations of Lord Rosse and Mr Lassell, De La Rue's long series of photographs, and the spectroscopic observations of Huggins and Lockyer.

In addition to regular astronomical observations of all kinds, national observatories are usually charged with the distribution of time signals, and the rating of chronometers for the navy—matters of great practical importance, especially in this country, where Greenwich time is communicated directly by telegraph to more than six hundred towns.

**OBSIDIAN**, a mineral accurately described by Pliny under the name which it still bears. It is a true kind of native glass, composed of silica (from 70 to 80 per cent.), alumina, lime, soda, potash, and oxide of iron. It is hard and brittle, with remarkably vitreous lustre, and perfectly conchoidal fracture, the edges of the fractures very sharp and cutting like glass. It varies from semitransparency to translucency only on the edges. It is often black, or very dark gray; sometimes green, red, brown, striped, or spotted; and sometimes *chatoyant* or *aventurine*. It occurs in volcanic situations, and often in close connection with pumice, in roundish compact pieces, in grains and in fibres. It is capable of being polished, but is apt to break in the process. It is made into boxes, buttons, ear-drops, and other ornamental articles; and before the uses of the metals were well known, it was employed, in different parts of the world, for making arrow and spear heads, knives, &c. It is found in Iceland, the Lipari Isles, Vesuvius, Sardinia, Hungary, Spailu, Teneriffe, Mexico, South America, Madagascar, Siberia, &c. Black O. was used by the ancients for making mirrors, and for this purpose was brought to Rome from Ethiopia. It was used for the same purpose in Peru and Mexico. Mirrors of Black O. are indeed still employed by artists. Chatoyant or Aventurine O. is very beautiful when cut and polished, and ornaments made of it are sold at a comparatively high price.

**O'VERSE**, or face, the side of a coin or medal which contains the principal device or inscription, the other side being in contradistinction called the reverse. See **NUMISMATICS**.

**OCCAM**, William of, surnamed *Doctor Singularis et Invincibilis*, a famous schoolman, was born in England, at the village of Ockam, in the county of Surrey, about the year 1270. We do not possess any precise or satisfactory knowledge of his early life. He is said to have been educated at Merton College, Oxford, and to have held several benefices in his native country, but soon after resigned them on entering the Franciscan order. Early in the 14th c., it is supposed he proceeded to Paris, where he attended the lectures of Duns Scotus, of whose philosophy he was afterwards the most formidable opponent. Here he soon became prominent by the boldness of his ecclesiastical views. Philippe, *le Bel*, king of France, having forbidden Pope Boniface VIII. to levy contributions in his dominions, the latter, by way of retaliation, excommunicated him. O. rushed to the defence of the monarch, and in his "*Disputatio inter Clericum et Militem, super Potestate prelati Ecclesiæ atque Principibus Terrarum Commissa*," denies that the popes have any authority in temporal affairs, and boldly declares that all who favored such a doctrine ought to be expelled from the church as heretics. Meanwhile, from being a listener, he had become a lecturer in philosophy. The system which he advocated—for he was not properly its originator—is known by the name of *Nominalism* (q. v.), but it had never before received so rigorously logical and rational a treatment; hence his epithet of

*Invincibilis*. The work in which his views are set forth is entitled "Expositio Anrea, et admodum utilis super totam Artem Veterem." It contains a series of commentaries upon the "Isagoge" of Porphyry, and on the "Categories" and "Interpretation of Aristotle, with a special treatise headed "Tractatus Communis Porphyrii," and a theological opusculum on Predestination. It is intended as a demolition of the moderns—i. e., the scholastics—and shews that in their method they have completely departed from the principles and methods of the great Stagyræ, for whom, like every sound and solid thinker, he shews the deepest respect and admiration. About 1390 or 1391, he again plunged into ecclesiastical controversy. A certain Narbonesc priest, having affirmed that Jesus Christ and his apostles held everything in common, and that every ecclesiastical possession is a modern abuse, was pounced upon by the inquisitors, and defended by a certain Berenger Talon, a Franciscan monk of Perpignan. But Berenger's defence of apostolical poverty was naturally enough very disagreeable to the pope, John XXII., who therefore condemned it. Berenger was, however, vigorously supported by his order, and among others by Michael de Cesena, the general-superior, Bonagratia of Bergamo, and William of Occam, who attacked the pope with great vehemence and trenchant logic. Shortly after they were arrested as favorers of heresy, and imprisoned in Avignon. But while their trial was proceeding, Michael de Cesena and O., knowing what little mercy or justice they had to expect from their accusers and judges, made their escape to the Mediterranean, and were received at a little distance off shore on board a galley of Ludwig, king of Bavaria, the patron of the Franciscan anti-pope, Peter of Corbaras, and one of the most powerful sovereigns in Europe. The remainder of O.'s life was spent at Munich, where, safe from the machinations of his enemies, he continued to assail at once the errors of papistry in religion, and of realism in philosophy. He died 7th April 1347. It is impossible to praise O. too highly. He was the first logician, and the most rational philosopher among the whole body of schoolmen. We are often reminded by his clear and vigorous common sense and wholesome incredulity, that he was the countryman of Locke and Hobbes, and that he came of a people ever noted for the solidity of their understanding. Besides the works already mentioned, O.'s principal writings are—"Dialogus in tres Partes distinctus, quarum prima de Hæreticis, secunda de Erroribus Joannis XXII., tertia de Potestate Papæ, Conciliorum et Imperatoris;" "Opus Nonaginta Dierum contra Errores Joannis XXII.;" "Compendium Errorum Joannis Papæ XXII.;" "Decisiones Octo Questionum de Potestate summi Pontificis;" "Super Quatuor Libros Sententiarum Sabitissimæ Questiones earumque Decisiones" (based on Peter the Lombard's famous "Sententie," and containing nearly the entire theology of Occam. These "Decisiones" were long almost as renowned as the "Sententie," which gave them birth); "Antilogia Theologicum;" "Summa Logices ad Adamum;" and "Major Summa Logices."—See Luke Wadding's "Scriptores Ordinis Minorum" (1650); Cousin's "Histoire de la Philosophie" (2d ed. 1840); and B. Haureau's "De la Philosophie Scholastique" (1845).

**OCCASIONALISM**, or the doctrine of Occasional Causes (see CAUSE), is the name given to the philosophical system devised by Descartes and his school, for the purpose of explaining the action of mind upon matter, or, to speak more correctly, the combined, or at least the synchronous action of both. It is a palpable fact that certain actions or modifications of the body are accompanied by corresponding acts of mind, and *vice versa*. This fact, although it presents no difficulty to the popular conception, according to which each is supposed to act directly upon the other—body upon mind, and mind upon body—has long furnished to philosophers a subject of much speculation. But on the other hand, it is difficult to conceive the possibility of any *direct* mutual interaction of substances so dissimilar, or rather so disparate. And more than one system has been devised for the explanation of the problem, as to the relations which subsist between the mind and the body, in reference to those operations, which are clearly attributable to them both. According to Descartes and the Occasionalists, the action of the mind is not, and cannot be the cause of the corresponding action of the body. But they hold that whenever any action of the mind takes place, God directly produces, in connection with it, and by reason of it, a corresponding action of the body; and in like manner conversely, they explain the coincident or synchronous actions of the body and the mind. It was in opposition to this view that Leibnitz, believing the Cartesian system to be open to nearly equal difficulties with that of the direct action, devised his system of *Pre-established Har-*

*mony.* See **LEIBNITZ**. His real objection to the Occasionalist hypothesis is, that it supposed a perpetual action of God upon creatures, and, in fact, is but a modification of the system of "direct assistance."

**OCCULTATIONS** (Lat. *occultatio*, a concealment) are neither more nor less than "eclipses;" but the latter term is confined by usage to the obscuration of the sun by the moon, and of the moon by the earth's shadow, while the former is restricted to the eclipses of stars or planets by the moon. Occultations are phenomena of frequent occurrence; they are confined to a belt of the heavens about  $10^{\circ}$   $17\frac{1}{2}'$  wide, situated parallel to, and on both sides of the equinoctial, and extending to equal distances north and south of it, being the belt within which the moon's orbit lies. These phenomena serve as data for the measurement of the moon's parallax; and they are also occasionally employed in the calculation of longitudes. As the moon moves in her orbit from west to east, the occultation of a star is made at the moon's eastern limb, and the star emerges on the western limb. When a star is occulted by the dark limb of the moon (a phenomenon which can only occur between new moon and full moon), it appears to an observer as if it were suddenly extinguished, and this appearance is most deceptive when the moon is only a few days old. When an occultation occurs between full moon and new moon, the reappearance of the star at the outer edge of the dark limb produces an equally startling effect. "It has often been remarked," says Herschel, "that when a star is being occulted by the moon, it appears to advance actually *upon* and *within* the edge of the disc before it disappears, and that sometimes to a considerable depth." This phenomenon he considers to be an optical illusion, though he admits the possibility of its being caused by the existence of deep fissures in the moon's substance. Occultations of stars by planets and their satellites are of rarer occurrence than lunar occultations, and still more unfrequent are the occultations of one planet by another. Occultations are calculated in the same way as eclipses, but the calculation is simplified in the case of the fixed stars, on account of their having neither sensible motion, semi-diameter, nor parallax.

**OCEAN**, a term which, like **SEA**, in its general acceptation, denotes the body of salt water that separates continent from continent, and is the receptacle for the waters of rivers. The surface of the ocean is about three-fifths of the whole surface of the earth. Although no portion of it is completely detached from the rest, the intervening continents and islands mark it off into divisions, which geographers have distinguished by special names: the *Atlantic Ocean* (q. v.), between America and Europe and Africa; the *Pacific Ocean* (q. v.), between America and Asia; the *Indian Ocean* (q. v.), lying south of Asia, and limited on the east and west by Australasia and South Africa; the *Arctic Ocean* (q. v.), surrounding the north pole; and the *Antarctic Ocean* (q. v.), surrounding the south pole. The general features and characteristics of the ocean will be described under **SEA**.

**OCEANIA**, the name given to the fifth division of the globe, comprising all the islands which intervene between the south-eastern shores of the continent of Asia and the western shores of the American continent. It naturally divides itself into three great sections—Malay Archipelago (q. v.), Australasia (q. v.), or Melanesia and Polynesia (q. v.).

**O'CELOT**, the name of several species of *Felideæ*, natives of the tropical parts of South America, allied to the leopard by flexibility of body, length of tail, and other characters, but of much smaller size. They are usually included in the genus *Leopardus* by those who divide the *Felideæ* into a number of genera. They are inhabitants of forests, and very expert in climbing trees. Their prey consists in great part of birds. They are beautifully marked and colored. The best known species, or **COMMON O.** (*Felis pardalis*), a native of the warm parts of America, from Mexico to Brazil, is from two feet nine inches to four feet long, exclusive of the tail, which is from eleven to fifteen inches, and nearly of uniform thickness. The ears are thin, short, and pointed. The muzzle is rather elongated. The colors vary considerably, but the ground tint is always a rich red or tawny color, blending finely with the dark brown on the margins of the open spots, of which there are chains along the sides; the head, neck, and legs being also variously spotted or barred with dark brown or black. The O. is easily tamed, and is very gentle and playful, but excessively mischievous. It may be fed on porridge and milk, or other such food, and is said to be



Och 1  
Octagon

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then more gentle than if permitted to indulge in carnivorous appetites.—Very similar to the Common O. are several other American species, as the LINKED O. (*P. catenata*), the LONG-TAILED O. (*P. macrourus*), the CHATI (*P. mitis*), &c. The similarity extends to habits and disposition, as well as form.

O'CHIL HILLS, a hilly range in Scotland, occupying parts of the counties of Perth, Clackhannan, Stirling, Kinross, and Fife, and extending from the vicinity of Stirling north-east to the Firth of Tay. The range is 24 miles in length, and about 12 miles in breadth. The highest summit is Beuleugh (2352 feet), near the south-west extremity. The hills, which are formed chiefly of greenstone and basalt, contain silver, copper, and iron ores, and afford excellent pasturage.

OCHNACEÆ, a natural order of exogenous plants, containing not quite 100 known species, natives of tropical and subtropical countries. Some of them are trees, most of them under-shrubs; all are remarkable for their smoothness in all parts. Bitter and tonic qualities prevail in this order, and some species are medicinally used in their native countries. The seeds of *Gonphia jabotapita* yield an oil, which is used in salads in the West Indies and South America.

O'CHRES, the name usually applied to clays colored with the oxides of iron in various proportions, giving to the clay a lighter or deeper color. Strictly speaking, the term belongs only to a combination of peroxide of iron with water. From many mines large quantities of water charged with ferruginous mud are being continually pumped up, and from this water the colored mud or ochre settles. In this way large quantities are procured from the tin mines of Cornwall, and the lead and copper mines of North Wales and the Isle of Man. Ochres occur also ready formed, in beds several feet thick, in the various geological formations, and are occasionally worked, as at Shotover Hill, Oxford, in Holland, and many other places in Europe and America. Very remarkable beds are worked in Canada. The ochres so obtained are either calcined for use or not, according to the tint wanted. The operation adds much to the depth of color, by increasing the degree of oxidation of the contained iron. The most remarkable varieties of ochre are the Siena Earth (Terra di Siena) from Italy; the so-called red chalk, with which sheep are marked; Dutch Ochre; Armenian Bole or Lemnian Earth; Italian Rouge, and Bitry Ochre. They vary in color from an Isabelline yellow, through almost every shade of brown, up to a tolerably good red. The finest kinds are used by painters, the coarsest by carpenters for marking out their work, by farmers for marking cattle, &c.

O'CHRO. See HIBISCUS.

OCKMU'LGEE, a river in Georgia, U. S., which rises in the northern centre of the state by three branches, and after a course of 200 miles south-south-east, joins the Oconee, to form the Altamaha. It is navigable to Macon, 130 miles above its mouth.

OCO'NEE, a river of Georgia, U. S., rises in the north-east part of the state, and flows southerly 250 miles, where it unites with the Ockmulgee to form the Altamaha; it is navigable to Milledgeville, 100 miles.

O'CONNELL, Daniel, eldest son of Mr Morgan O'Connell of Darrynane, near Cahirciveen, in the county of Kerry, Ireland, was born August 9, 1775. His family was ancient, but straitened in circumstances. O'C. received his first education from a hedge-schoolmaster, and after a further training under a Catholic priest in the county of Cork, was sent in 1790 to the English College at St Omer. His school reputation was very high; but he was driven home prematurely by the outbreak of the Revolution, and in 1794, entered as a law-student at Lincoln's Inn. In 1793, he was called to the bar; and it was the boast of his later career as an advocate of the Repeal of the Union with England, that his first public speech was delivered at a meeting in Dublin, convened for the purpose of protesting against that projected measure. He devoted himself assiduously, however, to the practice of his profession, in which he rose steadily. By degrees, the Roman Catholic party having begun to rally from the prostration into which they had been thrown through the rebellion of 1798 and its consequences, O'C. was drawn into public political life. In all the meetings of his co-religionists for the prosecution of their claims, he took a part, and his unquestioned ability soon made him a leader. He was an active

member of all the successive associations which, under the various names of "Catholic Board," "Catholic Committee," "Catholic Association," &c., were organised for the purpose of procuring the repeal of the civil disabilities of the Catholic body. Of the Catholic Association he was himself the originator; and although his supremacy in its councils was occasionally challenged by some aspiring associates, he continued all but supreme down to its final dissolution. By means of this association, and the "Catholic Rent" which it was enabled to raise, he created so formidable an organisation throughout Ireland, that it gradually became apparent that the desired measure of relief could not longer be safely withheld; and the crisis was precipitated by the bold expedient adopted by O'C., of procuring himself to be elected member of parliament for Clare in 1828, notwithstanding his well-known legal incapacity to serve in parliament, in consequence of his being obliged to refuse the prescribed oaths of abjuration and supremacy, which then formed the ground of the exclusion of Roman Catholics from the legislature. This decisive step towards the settlement of the question, although it failed to procure for O'C. admission to parliament, led to discussions within the House, and to agitations outside, so formidable, that in the beginning of the year 1829, the Duke of Wellington and Sir Robert Peel found it expedient to give way; and, deserting their former party, they introduced and carried through, in the spring of that year, the well-known measure of Catholic Emancipation. O'C. was at once re-elected, and took his seat for Clare, and from that date until his death continued to sit in parliament. He was elected for his native county in 1830, for the city of Dublin in 1836, for the town of Kilkenny in 1836 (having been unseated for Dublin on petition), for Dublin again in 1837, and for the county of Cork in 1841. During all these years, having entirely relinquished his practice for the purpose of devoting himself to public affairs, he received, by means of an organised annual subsidy, a large yearly income from the voluntary contributions of the people, by whom he was idolised as their "Liberator;" and who joined with him in all the successive agitations against the act of Union, against the Protestant Church establishment, and in favor of reform, in which he engaged. In the progress of more than one of these political agitations, his associations were suppressed by the government; and the agitation for a Repeal of the Union, recommenced in 1841, and carried on by "monster meetings" throughout Ireland, at which O'C. himself was the chief speaker, assumed proportions so formidable, that he, in common with several others, was indicted for a seditious conspiracy, and after a long and memorable trial, was convicted, and sentenced to a year's imprisonment, with a fine of £2000. This judgment was reversed by the House of Lords; and O'C., on his discharge, resumed his career; but his health had suffered from confinement, and still more from dissensions and opposition in the councils of his party; and as, on the return of the Whigs to power in 1846, he consented to support their government, the malcontents of the Repeal Association openly separated from him, and a bitter feud between "Young" and "Old" Ireland ensued. In this quarrel, O'C. steadfastly maintained his favorite precept of "moral force," and was supported by the great body of the Catholic bishops and clergy; but his health gave way in the struggle. He was ordered to try a milder climate; and on his journey to Rome in the spring of 1847, he was suddenly seized with paralysis, and died at Genoa on the 15th May of that year. His eminence as a public speaker, and especially as a master of popular eloquence, is universally admitted. Into the controversies as to his public and political character, it is not our place to enter here. His speeches unfortunately were for the most part extempore, and exist but in the reports (uncorrected by himself) taken at the time. He published but a single volume, "A Memoir of Ireland, Native and Saxon," and a few pamphlets; the most important of which, as illustrating his personal history and character, is "A Letter to the Earl of Shrewsbury."—See "Life and Times of Daniel O'Connell," by his son, John O'Connell; also "Recollections of Daniel O'Connell," by John O'Neill Daniel; Fagan's "Life of Daniel O'Connell;" and "The Liberator," by L. F. Cusack (1872).

OCTAGON, a plane closed figure of eight sides. When the sides are equal, and also the angles, the figure is called a "regular octagon;" in this case, each angle is  $135^\circ$ , or equal to three half right angles. If the alternate corners of a regular octagon be joined, a square is constructed; and as the angle contained between the sides of

Octahedron  
Odd

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the square and of the octagon is one-fourth of a right angle, the octagon may easily be constructed from the square as a basis.

**OCTAHEDRON**, (Gr. *okto*, eight, *hedra*, base) is a solid figure bounded by eight triangles, and having twelve edges and six angles. A regular octahedron has its eight triangular faces all equilateral, and may, for convenience, be defined as a figure composed of two equal and similar square pyramids with equilateral triangles for their sides placed base to base. This solid is symmetrical round any angle, and is one of Plato's five regular solids. The octahedron appears in nature as one of the forms of crystals of sulphur.

**OCTAVE** (Lat. *octava*, eighth), the interval between any musical note and its most perfect concord, which is double its pitch, and occupies the position of the eighth note from it on the diatonic scale. The name octave is often given to the eighth note itself as well as to the interval. There is between a note and its octave a far closer relation than between any other two notes; they go together almost as one musical sound. In combination, they are hardly distinguishable from one another, and their harmonics agree invariably, a coincidence which occurs in the case of no other interval.

**OCTAVIA**, the sister of the Roman emperor Augustus, and wife of Mark Antony. She was distinguished for her beauty, her noble disposition, and womanly virtues. Her first husband was C. Marcellus, to whom she was married 50 B.C. He died 41 B.C., shortly after which she consented to marry Antony, to make secure the reconciliation between him and her brother. The event was hailed with joy by all classes. In a few years, Antony became tired of his gentle and virtuous spouse, and forsook her for Cleopatra. When the Parthian War broke out, O. wanted to accompany her husband, and actually went as far as Corcyra, whence Antony sent her home, that she might not interrupt his guilty intercourse with the Egyptian queen. In 35 B.C., O. made an effort to rescue him from a degradation that was indifferent even to the honor of the Roman arms, and sailed from Italy with reinforcements; but a message reached her at Athens ordering her to return home. She proudly obeyed, but, with a magnanimity that reminds us of the Roman character in earlier and better days, she forwarded the supports to her husband. Her brother, Octavian, was indignant at the treatment she received, and would have had her quit her husband's house, and come and live with him; but she refused. In 33 B.C., war, long inevitable, broke out between Antony and Octavian; and the former crowned his insults by sending O. a bill of divorce. But no injury was too great to be forgiven by this "patient Grisel" of the ancient world; and after her husband's death, she brought up with maternal care not only her own children, but also Cleopatra's bastards. Her death took place 11 B.C.

**OCTOBER** (Lat. *octo*, eight) was the eighth month of the so-called "year of Romulus," but became the tenth when (according to tradition) Numa changed the commencement of the year to the first of January, though it retained its original name. It has since maintained its position as the tenth month of the year, and has 31 days. October preserved its ancient name notwithstanding the attempts made by the Roman senate, and the emperors Commodus and Domitian, who substituted for a time the terms *Faustinus*, *Invictus*, *Domitianus*. Many Roman and Greek festivals fell to be celebrated in this month, the most remarkable of which was the sacrifice at Rome of a horse (which was called *October*) to the god Mars. The other festivals were chiefly bacchanalian. Among the Saxons, it was styled *Wyn moneth* or the wine month.

**OCTOPODA** (Gr. eight-footed), a section of dibranchiate cephalopods (see *CERIALOPODA*), having the body in general very short, the head very distinct; eight arms, not very unequal, furnished with simple suckers; with or without a shelly covering. To this section belong Argonauts, Poulpes, &c.

**OCTOPUS**. See *POLYP*.

**OCTOSTYLE**, the name given in classic architecture to a portico composed of eight columns in front.

**OCTROI** (Lat. *auctoritas*, authority), a term which originally meant any ordinance authorised by the sovereign, and thence came to be restrictively applied to a

toll or tax in kind levied from a very early period in France and other countries of Northern Europe, on articles of food which passed the barrier or entrance of a town. The right to levy this toll was often delegated to subjects, and in order to increase its amount, a device was resorted to of raising the weight of the pound in which the octroi was taken. The large pound, an ounce heavier than that in ordinary use, was called the *livre d'octroi*, whence the expression *pound troy*. The octroi came eventually to be levied in money, and was abolished in France at the Revolution. In 1793, it was re-established, under the pretext that it was required for purposes of charity and called the *octroi de bienfaisance*, and it has been reorganised in 1816, 1842, and 1852. Of the octroi duty which is at present levied at the gates of the French towns, one-tenth goes to the national treasury, and the rest to local expenses. The octroi officers are entitled to search all carriages and individuals entering the gates of a town. From the octrois of Paris, government derived, a few years ago, a revenue of 56 million francs. In 1860, the Belgian government acquired popularity by abolishing the octroi.

The epithet *octroyé* is applied by continental politicians to a constitution granted by a prince, in contradistinction to one which is the result of a pacton between the sovereign and the representatives of the people. Any public company possessing an authorised monopoly like that held by the East India Company, is said to be *octroyé*.

OD (from the same root as Odin, and supposed to mean all-pervading), the name given by Baron Reichenbach (q. v.) to a peculiar physical force which he thought he had discovered. This force, according to him, pervades all nature, and manifests itself as a flickering flame or luminous appearance at the poles of magnets, at the poles of crystals, and wherever chemical action is going on. This would account for the luminous figures said to be sometimes seen over recent graves. The od force has positive and negative poles, like magnetism. The human body is od-positive on the left side, and od-negative on the right. Certain persons, called "sensitives," can see the odic radiation like a luminous vapor in the dark, and can feel it by the touch like a breath. As the meeting of like odic poles causes a disagreeable sensation, while the pairing of unlike poles causes a pleasant sensation, we have thus a sufficient cause for those likings and antipathies hitherto held unaccountable. Some sensitive persons cannot sleep on their left side (in the northern hemisphere), because the north pole of the earth, which is od-negative, affects unpleasantly the od-negative left side. All motion generates od; why, then, may not a stream running underground affect a sensitive water-fluder, so that the divining-rod in his or her hand shall move without, it may be, any conscious effort of will? All the phenomena of mesmerism are ascribed to the workings of this od-force. Reichenbach does not pretend to have had the evidence of his own senses for any of those manifestations of his assumed od-force; the whole theory rests on the revelations made to him by "sensitives." It may be added, that few if any really scientific men have any belief in the existence of such a force.—Those curious in such matters are referred for the details of the subject to Reichenbach's large work, translated into English by Dr Ashburner, under the title of "The Dynamics of Magnetism," or to a briefer account in his "Odisch-Magnetische Briefe" (Stutt. 1852).

O'DAL or Udal Right (Celtic *od*, property), a tenure of land which was absolute, and not dependent on a superior, and prevailed throughout Northern Europe before the rise of feudalism. It was founded on the tie of blood which connected freeman with freeman, and not on the tie of service. It was the policy of the sovereign authority everywhere to make it advantageous for the freemen to exchange the odal tie for the tie of service—a change which paved the way for the feudal system. The odal-lords of Orkney were allowed to retain or resume their ancient privileges on paying a large contribution to the erection of St Magnus's Cathedral at Kirkwall; and the Odal tenure prevails to this day to a large extent in the Orkney and Shetland Islands, the right to land being completed without writing by undisturbed possession proved by witnesses before an inquest.

ODD-FELLOWS, the name assumed by one of the most extensive self-governed provident associations in the world. The institution was originated in Manchester in 1812, although isolated "lodges" had existed in various parts of the country for some time previously. These latter were generally secret fraternities, humble imi-

tations of Freemasonry—adopting a similar system of initiatory rites, phraseology, and organisation—instituted for social and convivial purposes, and only occasionally extending charitable assistance to members. On its institution in Manchester, the main purpose of Odd-fellowship was declared by its laws to be, “to render assistance to every brother who may apply through sickness, distress, or otherwise, if he be well attached to the Queen and government, and faithful to the order;” and this continues to be the basis of all its operations. It still, however, retains some of the characteristics of Freemasonry, in possessing pass-words and peculiar “grips,” whereby members can recognise one another. The headquarters of the society are at Manchester, where the Grand Master and Board of Directors meet quarterly to hear appeals, and transact the general business of the order. In January 1852, the total number of members was 224,441; in January 1873, the number was 470,043; and during 1872, 84,699 new members joined. The lodges number 4008, spread over 465 districts; the annual income being about £595,000, with an expenditure of nearly £396,000. Should any lodge fail to meet its legitimate obligations, the district becomes liable; failing the district, the responsibility falls upon the entire Unity. The order is widely spread over the whole of England and Scotland. It exists independently in America, Australia, New Zealand, and the West Indies; but there are “lodges” in Philadelphia, New York, in all the British colonies, and one in Constantinople (originated in 1862), which are affiliated to and in connection with the Manchester Board. These wide-spread ramifications of this society enable emigrant members to be at once received into fellowship in those countries. In the American states, Odd-fellowship is said to exercise considerable political influence. A quarterly periodical, called the “Odd-fellows’ Magazine,” devoted to its interests, is published in Manchester. In an early number of this publication, an Oddfellow is described as “like a fox for cunning, a dove for tameness, a lamb for innocence, a lion for boldness, a bee for industry, and a sheep for usefulness.”

ODE (Gr. a song) originally meant any lyrical piece adapted to be sung. In the modern use of the word, odes are distinguished from songs by not being necessarily in a form to be sung, and by embodying loftier conceptions and more intense and passionate emotions. The language of the ode is therefore abrupt, concise, and energetic; and the highest art of the poet is called into requisition in adapting the metres and cadences to the varying thoughts and emotions. Hence the changes of metre and versification that occur in many odes. The rapt state of inspiration that gives birth to the ode, leads the poet to conceive all nature as animated and conscious, and, instead of speaking *about* persons and objects, to address them as present.

Among the highest examples of the ode are the “Song of Moses” and several of the psalms. Dryden’s “Alexander’s Feast” is reckoned one of the first odes in the English language. We may mention, as additional specimens, Gray’s “Bard,” Collius’s “Ode to the Passions,” Burns’s “Scots wha hae,” Coleridge’s “Ode to the Departing Year and Dejection,” Shelley’s “Ode to the Skylark,” and Wordsworth’s “Ode on the Recollections of Immortality in Childhood.”

O'DENKIRCHEN, a town of Rhenish Prussia, 15 miles west-south-west from Düsseldorf, near the right bank of the Rhine. It has manufactures of velvets, paper, leather, &c., and like many of the other manufacturing towns in the same district, has recently much increased in size and population. Pop. (1871) 7631.

O'DENSEE (anciently known as Odin's-Ey, or Odin's Oe (i. e., Odin's Island), the chief town of the Danish island of Fünen, and the oldest city of the kingdom, is situated in the amt or district of the same name, in 56° 25' n. lat., and 10° 30' e. long. Pop. (1870) 16,970. O., which is the seat of the governor of the island and the see of a bishop, has a gymnasium, several literary societies, and is an active, thriving, provincial town. A bishopric was founded here in 988, prior to which time O. bore the reputation of being the first city established by Odin and his followers. The cathedral, founded in 1086 by St Knud, whose remains, like those of several of the early Danish kings, were deposited here, is a fine specimen of the early simple Gothic style. The lay convent or college for ladies contains an extensive library, furnished with copies of all printed Danish works. At O. a diet was held in 1537, in which the Reformed or Lutheran doctrines were declared to be the established creed of Den-

mark, and equality of rights was granted to Protestants; while another diet held here in 1539 promulgated the laws regulating the affairs of the Reformed Church.

O'DENWALD. See HESSE-DARMSTADT.

O'DER (Lat. *Vindrus*, Slavon. *Vjodr*), one of the principal rivers of Germany, rises in the Leseberg on the table-land of Moravia, more than 1000 feet above the level of the sea, and enters Prussian Silesia at Odersberg, after a course of some 60 miles. After traversing Brandenburg in a north-west direction, it crosses Pomerania, and empties itself into the Stettiner Haff, from whence it passes into the Baltic by the triple arms of the Dievenow, Peene, and Swine, which enclose the islands of Wollin and Usedom. The O. has a course of more than 500 miles, and a river-basin of 50,000 square miles. The rapid flow of this river, induced by its very considerable fall, is accelerated by the affluence of several important mountain-streams, and thus contributes, together with the silting at the embouchures of these streams, to render the navigation difficult; great expense and labor being, moreover, necessary to keep the embankments in order, and prevent the overflowing of the river. The O. has numerous secondary streams, the most important of which are the Oppa, Neisse, Oulan, Klodnitz, Bartach, Warde, and the Ihua; and is connected with the Havel and thence with the Elbe by the Finow Canal, and with the Spree by the Friedrich-Wilhelms Canal. The chief trading port of the O. is Swinemünde, which constitutes an important centre for the transfer of colonial and other foreign goods to Northern Germany and Poland. At Ratibor, 17 miles below Oderberg, the river becomes navigable, and is upwards of 100 feet in breadth; at Oppeln, in Prussian Silesia, it has a breadth of 238 feet. As a boundary river, it is of considerable importance in a military point of view, and is well defended by the fortresses of Kosel, Grossglogau, Küstrin, and Stettin.

ODE'SSA, an important seaport and commercial city of South Russia, in the government of Kherson, stands on an acclivity sloping to the shore, on the north-west coast of the Black Sea, 33 miles north-east of the mouth of the Dniester. Lat. 46° 29' N., long. 30° 44' E. The harbor is formed by two large moles defended by strong works, and is capable of containing 300 vessels. The bay is deep enough even close in shore to admit the approach of the largest men-of-war, and is frozen only in the severest winters, and then only for a short time. The promenade along the face of the cliff, descending to the shore by a broad stone stair of 204 steps, is the favorite walk of the inhabitants. Here also stands the monument of the Duc de Richelieu, to whom in great part the town is indebted for its prosperity. In the pedestal of the monument is preserved the ball by which he was shot during the bombardment of the town by the allied fleet in 1854. The university of O., founded in 1865, had, in 1877, 43 professors and 252 students; and the library possessed over 150,000 volumes. The city contains many fine edifices, as the Cathedral of St Nicholas, the Admiralty, the Custom-house, &c. Owing to the intensity of the heat in summer (rising occasionally to 120°), and the dryness of the soil, vegetation in the vicinity of O. is very poor. In the neighborhood are quarries of soft stone, which is used for building purposes in O. and in the surrounding towns. One of the great deficiencies of O. used to be its want of good water; but works for securing an ample supply from the Dniester were completed in 1873. Gas was first used in O. in 1861; and the theatre, the hotels, and all the larger houses now use this healthiest of the artificial lights. A railway, opened in 1872, has added enormously to the commercial success and importance of O., as it connects it, and of course Kherson, with the governments north and east of it in Russia. The estimated value of the various quantities of grain, wool, hides, tallow, and other articles of export for the year 1871, was £7,110,000, of which amount, the value of goods shipped to the United Kingdom and its colonies, or for other parts of Europe, in British vessels, was £2,372,000—about a third of the whole outward trade. The rapid strides O. has made in commerce within the last few years, will be seen when this latter sum is compared with the corresponding ones of 1868 and 1869; the former year shewing the sum of £670,000; and the latter exhibiting a fall down to £468,000. The population of O. in 1867 was 121,385.

In ancient times O. (Gr. *Odrassus*) was inhabited by a Greek colony, and later by Tartar tribes. In the beginning of the 15th c., the Turks constructed a fortress here, which was taken by the Russians in 1789. In 1793, a Russian fortress was built

Odeypoor  
Odoacer

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here, and became the nucleus of a town and port, which two years after received the name of Odessa. The Duc de Richelieu, a French emigrant in the Russian service, was appointed governor here in 1808, and during the eleven years of his wise administration, the town prospered rapidly. Since 1823, the city has formed part of the general governorship of South Russia; is the seat of its administration, and is the residence of the governor-general and of an arch-bishop. The advantageous commercial position of the city, and the privileges granted to it by government, but chiefly the privileges of a free port between 1817 and 1858 (in place of which it now receives an annual subsidy) have developed this city from a mere Turkish fortress into the chief commercial town of the Russian empire after St Petersburg and Riga. On the outbreak of the Crimean War, April 1854, the British steamer *Furious* went to O. for the purpose of bringing away the British consul. While under a flag of truce, she was fired upon by the batteries of the city. On the failure of a written message from the admirals in command of the fleet to obtain explanations, twelve war-ships invested O., 22d April, and in a few hours destroyed the fortifications, and took a number of Russian vessels.

ODEYPOO'R, Oodypore, or Udaipur, the name of several territories in India.—1. The principal is a Rajpoot state, also called Meywar; area about 11,600 sq. m., and pop. (1871) 1,160,000.—2. A tributary state in Chota Nagpore, with an area of 1051 sq. m.; pop. 27,703.—3. Chota O. is a tributary state in Gujerat; area 650 m.; pop. 62,913.

O'DIN, the chief god of Northern Mythology. According to the sagas, O. and his brothers, Vile and Ve, the sons of *Boer*, or the first-born, slew Ymer or Chaos, and from his body created the world, converting his flesh into dry land; his blood, which at first occasioned a flood, into the sea; his bones into mountains; his skull into the vault of heaven; and his brows into the spot known as *Midgaard*, the middle part of the earth, intended for the habitation of the sons of men. O., as the highest of the gods, the *Alfader*, rules heaven and earth, and is omniscient. As ruler of heaven, his seat is Valaskjalf, from whence his two black ravens, Huginn (Thought) and Muninn (Memory), fly daily forth to gather tidings of all that is being done throughout the world. As god of war, he holds his court in Valhalla, whither come all brave warriors after death to revel in the tumultuous joys in which they took most pleasure while on earth. His greatest treasures are his eight-footed steed Sleipner, his spear Gungner, and his ring Draupner. As the concentration and source of all greatness, excellence, and activity, O. bears numerous different names. By drinking from Mimir's fountain, he became the wisest of gods and men, but he purchased the distinction at the cost of one eye. He is the greatest of sorcerers, and imparts a knowledge of his wondrous arts to his favorites. Frigga is his queen, and the mother of Baldur, the Scandinavian Apollo; but he has other wives and favorites, and a numerous progeny of sons and daughters. Although the worship of O. extended over all the Scandinavian lands, it found its most zealous followers in Denmark, where he still rides abroad as the wild huntsman, rushing over land and water in the storm-beaten skies of winter.

The historical interpretation of this myth, as given by Snorre Sturleson, the compiler of the "Heimskringla, or Chronicles of the Kings of Norway prior to the introduction of Christianity," and followed in recent times by the historian Suhm, is, that O. was a chief of the *Æsir*, a Scythian tribe, who, fleeing before the ruthless aggressions of the Romans, passed through Germany to Scandinavia, where, by their noble appearance, superior prowess, and higher intelligence, they easily vanquished the inferior races of those lands, and persuaded them that they were of godlike origin. According to one tradition, O. conquered the country of the Saxons on his way; and leaving one of his sons to rule there, and introduced a new religion, in which he, as the chief god Wotan, received divine honors, advanced on his victorious course, and making himself master of Denmark, placed another son, Skjold, to reign over the land, from whom descended the royal dynasty of the Skjoldingar. He next entered Sweden, where the king, Gylf, accepted his new religion, and with the whole nation worshipped him as a divinity, and received his son Yngvi as their supreme lord and high-priest, from whom descended the royal race of the Ynglingar, who long reigned in Sweden. In like manner he founded, through his son Scemling, a new dynasty in Norway; and besides these, many sovereign families of Northern Germany, includ-

ing our own Saxon princes, traced their descent to Odln. As it has been found impossible to refer to one individual all the mythical and historical elements which group themselves around the name of O., Wodin, or Wuotan, it has been suggested by Sahm and other historians, that there may have been two or three ancient northern heroes of the name; but notwithstanding the conjectures which have been advanced since the very dawn of the historical period in the north in regard to the origin and native country of the assumed O., or even the time at which he lived, all that relates to him is shrouded in complete obscurity. It is much more probable, however, that the myth of O. originated in nature-worship. See SCANDINAVIAN MYTHOLOGY.

ODOACER (also Odovacer, Odobagar, Odovachar, Otachar, &c., and, according to St Martiu, the same as Ottochar, a name frequent in Germany during the middle ages), the ruler of Italy from the year 476 to 493, was the son of Edecon, a secretary of Attila, and one of his ambassadors to the court of Constantinople. This Edecon was also captain of the Scyrri, who formed the bodyguard of the king of the Huns. After the death of Attila, he remained faithful to the family of his master, but perished about 468 in an unequal struggle with the Ostrogoths. He left two sons, Onulf and Odoacer, the former of whom went to seek his fortune in the East; while O., after leading for some time the life of a bandit chief among the Noric Alps, determined to proceed to Italy, whither barbarian adventurers were flocking from all Europe. According to a monkish legend, a pious hermit, St Severinus, whom he went to visit before his departure, prophesied his future greatness. O. entered the military service of the Western Roman Empire, and rapidly rose to eminence. He took part in the revolution by which Orestes (476) drove the Emperor Julius Nepos from the throne, and conferred on his son Romulus the title of Augustus, which the people scornfully changed into Augustulus. He soon perceived the weakness of the new ruler, and resolved to profit by it. He had little difficulty in persuading the barbarian soldiery, who had effected the revolution, that Italy belonged to them, and in their name demanded of Orestes the third part of the land, as the reward of their help. This Orestes refused; and O., at the head of his Herulians, Rugians, Turcilingians, and Scyrri, marched against Pavia, which Orestes had garrisoned, stormed the city, and put his opponent to death (476). Romulus abdicated, and withdrew into obscurity. What became of him, is not known. Thus perished the Roman empire. O. shewed himself to be a wise, moderate, and politic ruler, quite unlike our general notion of a barbarian. In order not to offend the Byzantine emperor Zeno, he took the title of king only, and caused the senate to despatch to Constantinople a flattering letter, in which it declared one emperor to be enough for both East and West; renounced its right of appointing the emperors, expressed its confidence in the civil and military talents of O., and begged Zeno to confer upon him the administration of Italy. After some hesitation, the Byzantine emperor yielded to the entreaties of the senate, and O. received the title of *Patricius*. He fixed his residence at Ravenna. According to his promise, he divided among his companions the third part of the land of Italy—a measure far less unjust than at first sight may seem, for the peninsula was then almost depopulated, and many domains were lying waste and ownerless. This barbarian ruler did everything in his power to lift Italy out of the deplorable condition into which she had sunk, and to breathe fresh life into her municipal institutions—those venerable relics of nobler days! He even re-established the consulate, which was held by eleven of the most illustrious senators in succession, maintained peace throughout the peninsula, overawed the Gauls and Germans, and reconquered Dalmatia and Noricum. In religion, though an Arian himself, he acted with a kingly impartiality that more orthodox monarchs have rarely exhibited. Gibbon remarks, with his usual pointed sarcasm, that the *silence* of the Catholics attests the toleration which they enjoyed. The valor, wisdom, and success of O. appear to have excited the jealousy and alarm of Zeno, who encouraged Theodoric, king of the Ostrogoths, a still greater warrior and sovereign than O. himself, to undertake an expedition against Italy. The first battle was fought on the banks of the Isontius (mod. Isonzo), 28th August 489. O. was beaten, and retreated. During his retreat, he hazarded another battle at Verona, and was again beaten. He now hastened to Rome to rouse the inhabitants, but the gates of the city were closed against him. Returning northwards to his capital, Ravenna, he reassembled the wreck of his army, and in 490 once more marched against the Ostrogoths, whose advance-guard



Odometer  
Œdema

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he defeated and pursued to the walls of Pavia. Another great battle now took place on the banks of the Adda, when O. was vanquished for the third time. He now shut himself up in Ravenna, where Theodoric besieged him for three years. O. then capitulated, on condition that the kingdom of Italy should be shared between him and Theodoric. This agreement was solemnly sworn to by both parties. 37th February 493; but on the 5th of March, O. was assassinated at a feast, either by Theodoric himself, or by his command.

ODO'METER (Gr. *odos*, a road, *métrōn*, a measure), also called *Perrambulator*, or *surveying-wheel*, is an instrument attached to a carriage or other vehicle, for the purpose of registering the distance it has travelled. Such machines have been in use from an early period, and one is described by Vitruvius in that part of his work "De Architectura" which is devoted to machines. The instrument, as commonly employed, consists of a train of wheel-work, which communicates motion from the axle of the carriage wheel to an index which moves round the circumference of a dial fixed in one side of the carriage over the axle. The wheel-work is arranged so as to produce a great diminution of the velocity impressed by the axle of the vehicle, and the dial is so graduated that the index can shew the number of miles, furlongs, yards, &c., traversed. The instrument is also constructed to work independently, being in this case provided with wheels and an axle of its own; when this is done, the wheel is made of such a size that its circumference is an aliquot part of a mile, an arrangement which greatly simplifies the calculation of the distance traversed. The complete odometer can then be drawn along by a man on foot, or attached behind a carriage. See PEDOMETER.

O'DONNELL, Leopold, Duke of Tetuan, Marshal of Spain, born in 1809, was descended from an ancient Irish family. He entered the Spanish army when young, and bravely espoused the cause of the infant Queen Isabella against her uncle, Don Carlos. When the Carlists were overthrown, he was created Count of Lucena, made General of Brigade, and Chief of the Staff to Espartero. He took the side of the Queen-mother in 1840; emigrated with her to France, at the time when her cause seemed desperate; and took up his residence at Orleans, where he planned many of the political risings and disturbances which took place under the rule of Espartero. He headed in person a revolt of the Navarrese against the minister, but on its failure returned to France. In 1848, his intrigues against Espartero (q. v.) were successful; and he was rewarded by the governor-generalship of Cuba, where he amassed a large fortune by favoring the iniquitous trade in slaves. When he returned to Spain (1845) he intrigued against Bravo Murillo and Narvaez; and when the latter was succeeded by Sartorius, O'D., proscribed by the government, headed a military insurrection. Defeated, and driven into Andalusia in 1854, he issued a liberal manifesto. The profligacy of the court, and the despotism of the government, favored the appeal; and when Espartero gave in his adhesion, the Spaniards rose *en masse*, and replaced the ex-regent at the helm. Espartero reversed the confiscation against O'D., and made him a marshal and minister of war. O'D. again plotted against his old benefactor, and in July 1856, supplanted him by a *coup d'état*. Blood was shed in the streets of Madrid, but O'D. remained president of the council. He was in three months' time succeeded by Narvaez; but in 1858 he returned to power again; and in 1859, while still holding the position of prime minister, he assumed the command of the army sent to Morocco. The campaign continued for many months, without leading either to reverses or glory. The Moors displayed an entire absence of military qualities; and O'D., though successful in obscure skirmishes, occupied three months in the march from Ceuta to Tetuan. A battle took place, February 4, 1860; O'D. gained a complete victory, took the Moorish camp, and the city of Tetuan surrendered to the Spaniards. The Emperor of Morocco submitted to a loss of territory, and O'D. was raised to the first rank of the Spanish nobles as Duke of Tetuan. He remained prime minister till 1866, when his cabinet was upset by Narvaez. He then received leave of absence—that is to say, was exiled, and spent the most of his time in Paris. He died at Biarritz in 1867. The O'D. ministry improved the finances, army, and administration of Spain.

ŒCOLAMPADIUS, Joannes—a name Latinised, according to the fashion of the age, from the German JOHANN HAUSSCHEIN—one of the most eminent of

the coadjutors of Zwingli in the Swiss Reformation, born in 1483 at Weinsberg, in Swabia. His father destined him for the profession of the law, and he studied for it in Heidelberg and Bologna; but yielding to his own strong inclination, he relinquished this study for that of theology, which he prosecuted at Heidelberg. He then became tutor to the sons of the Elector Palatine, and subsequently preacher in Weinsberg. This office he resigned in order to study the Greek language under Reuchlin at Stuttgart. He also learned Hebrew from a Spanish physician, Matthew Adrian. Being appointed preacher at Basel, he formed the acquaintance of Erasmus, who highly appreciated his classical attainments, and employed his assistance in his edition of the New Testament. In 1516, Œ. left Basel for Augsburg, where also he filled the office of preacher, and where he entered into a convent. But Luther's publications exercised so great an influence on him that he left the convent, and became chaplain to Franz Von Sickingen, after whose death he returned to Basel in 1522, and in the capacity of preacher and professor of theology, commenced his career as a reformer. He held disputations with supporters of the Church of Rome in Baden in 1526, and in Bern in 1528. In the controversy concerning the Lord's Supper, he gradually adopted more and more the views of Zwingli, and at last maintained them in 1525, in a treatise, to which the Swabian ministers replied in the "*Syngramma Senevicum*." In 1529 he disputed with Luther in the conference at Marburg. He died at Basel, 23d November 1531, not long after the death of his friend Zwingli. He was remarkable for his gentleness of character. His treatise, "*De Ritui Paschali*," and his "*Epistola Canonico-rum Indoctorum ad Ecclesiam*," are the most noted of his works.—See Herzog, "*Das Leben des Joh. Œcolampadius*" (1848); and Hagenbach's "*Œcolampadius*" (1859).

**ŒCUMENICAL** (Gr. *oikoumenike*, "of, or belonging to, the *oikoumene*," "the world"), the name given to councils of the entire church, and synonymous with the more ordinary name "general." See **CONCILIUM**. The conditions necessary to constitute an œcumenical council are a subject of much controversy. As the subject is of less importance in Protestant divinity, it will be enough to explain here that a council is said by Roman Catholic divines to be œcumenical in three different ways: viz., in convocation, in celebration, and in acceptance. For the first, the summons of the pope, direct or indirect, is held to be necessary; this summons must be addressed to all the bishops of the entire church. To the second, it is necessary that bishops from all parts of the church should be present, and in sufficient numbers to constitute a really representative assembly: they must be presided over by the pope, or a delegate or delegates of the pope; and they must enjoy liberty of discussion and of speech. For the third, the decrees of the council must be accepted by the pope, and by the body of the bishops throughout the church, at least tacitly. The last of these conditions is absolutely required to entitle the decrees of a council to the character of œcumenical; and even the decrees of provincial or national councils so accepted, may acquire all the weight of infallible decisions, in the eyes of Roman Catholics.

**ŒDEMA** (Gr. *a swelling*) is the term applied in Medicine to the swelling occasioned by the effusion or infiltration of serum into cellular or areolar structures. The subcutaneous cellular tissue is the most common, but is not the only seat of this affection. It is occasionally observed in the submucous and subserous cellular tissue, and in the cellular tissue of the parenchymatous viscera; and in some of these cases, it gives rise to symptoms which admit of easy recognition during life. Thus œdema of the glottis (see **LARYNX**) and œdema of the lungs constitute well-marked and serious forms of disease; while œdema of the brain, though not easily recognised during life, is not uncommonly met with in the *post-mortem* examination of insane patients.

Œdema may be either passive or active, the former being by far the most common. *Passive Œdema* arises from impeded venous circulation (as from obstruction or obliteration of one or more veins; from varicose veins; from standing continuously for long periods, till the force of the circulation is partly overcome by the physical action of gravitation; from deficiency in the action of the adjacent muscles, which in health materially aids the venous circulation, &c.); from too weak action of the heart (as in dilatation or certain forms of valvular disease of that organ); or from a too watery or otherwise diseased state of the blood (as in chlorosis,

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scurvy, Bright's disease, &c.). By means of the knowledge derived from pathological anatomy, we can often infer the cause from the seat of the swelling; for example, œdema of the face, usually commencing with the eyelids, is commonly caused by obstruction to the circulation through the left side of the heart, or by the diseased state of the blood in Bright's disease; and œdema of the lower extremities most commonly arises from obstruction in the right side of the heart, unless it can be traced to the pressure of the gravid uterus, or of accumulated feces in the colon, or to some other local cause.

*Active Œdema* is associated with an inflammatory action of the cellular tissue, and is most marked in certain forms of erysipelas. It is firmer to the touch, and pressure with the finger produces less pitting than in the passive form.

From the preceding remarks, it will be seen that œdema is not a disease, but a symptom, and often a symptom indicating great danger to life. The means of removing it must be directed to the morbid condition or cause of which it is the symptom.

**OE'DENBURG** (Hung. *Szovrony*; anc. *Sempronium*), a town of Hungary, capital of a county of the same name, situated in an extensive plain, about two miles west from the Nensiedler See, on the Ilkva, a branch of the Raab. It is connected by railway with Vienna. O. is one of the most beautiful towns in Hungary. It has manufactures of cotton and woollen goods, potash, nitre, tobacco, sugar, earthenware, glass, cutlery, &c.; and a considerable trade in wine, corn, tobacco, wax, honey, and cattle, the products of the neighborhood, which is rich and well cultivated. The wine of Rust, a small town eight miles north of O., on hills sloping to the Nensiedler See, is one of the best wines of Hungary, and inferior only to Tokay. The Roman station of *Sempronium* was one of considerable importance; and numerous Roman remains are found near Oedenburg. The inhabitants of O. are mostly of German race. Pop. (1869) 21,108.

**Œ'DIPUS** (Gr. *Oidipous*), the hero of a celebrated legend, which, though of a most revolting nature in itself, has supplied both Euripides and Sophocles with the subject-matter of some of their most celebrated tragedies. The story, as generally related, is as follows: Œ. was the son of Laius, king of Thebes, by Jocaste; but his father having consulted the oracle to ascertain whether he should have any issue, was informed that his wife would bring forth a son, by whom he (Laius) should ultimately be slain. Determined to avert so terrible an omen, Laius ordered the son which Jocaste bore him to have his feet pierced through, and to be exposed to perish on Mount Cithæron. In this helpless condition, Œ. was discovered by a herdsman, and conveyed to the court of Polybus, king of Corinth, who, in allusion to the swollen feet of the child, named him *Œdipus* (from *oidao*, to swell, and *pous*, the foot); and along with his wife, Merope, brought him up as his own son. Having come to man's estate, Œ. was one day taunted with the obscurity of his origin, and in consequence proceeded to Delphi, to consult the oracle. The response which he received was, that he would slay his father, and commit incest with his mother. To escape this fate, he avoided returning to Corinth, and proceeded to Thebes, on approaching which he encountered the chariot of his father; and the charioteer ordering him out of the way, a quarrel ensued, in which Œ. ignorantly slew Laius, and thus unconsciously fulfilled the first part of the oracle. The famous Sphinx (q. v.) now appeared near Thebes, and seating herself on a rock, propounded a riddle to every one who passed by, putting to death all who failed to solve it. The terror of the Thebans was extreme, and in despair they offered the kingdom, together with the hand of the queen, to the person who should be successful in delivering it from the monster. Œ. came forward; the Sphinx asked him, "What being has four feet, two feet, and three feet; only one voice; but whose feet vary, and when it has most, is weakest?" Œ. replied that it was "Man;" whereupon the Sphinx threw itself headlong from the rock. Œ. now became king, and husband of his mother, Jocaste. From their incestuous union sprang Eteocles, Polyneices, Antigone, and Ismene. A mysterious plague now devastated the country, and when the oracle declared that before it could be stayed, the murderer of Laius should be banished from the country, Œ. was told by the prophet Tiresias that he himself had both murdered his father and committed incest with his mother. In his horror he put out his own eyes, that he might no more look upon his fellow-creatures, while Jocaste hanged herself. Driven from his throne by

his sons and his brother-in-law, Creon, Cæ. wandered towards Attica, accompanied by Antigone, and took refuge in the grove of the Eumenides, who charitably removed him from earth; but the latter part of his life is differently told.

CEHLENSCHLÄGER, Adam Gottlob, the greatest poet of Northern Europe, was born in 1779 at Copenhagen. His early years were spent at the palace of Fredericksborg, in the neighborhood of the Danish capital, where his father was employed, first as organist, and afterwards as steward or bailiff. During the absence of the royal family in the winter, Cæ. and his sister amused themselves in roaming over the palace, and examining the paintings and works of art which it contained, and in improvising private theatricals, for which he supplied original pieces. After an irregular and desultory course of education, Cæ.'s love of the drama led him to offer his services to the manager of the Copenhagen theatre; but discovering soon that he had no chance of rising above the rank of a mere supernumerary, he entered the university of Copenhagen as a student of law. For a time, he seems to have pursued his studies with tolerable assiduity, under the direction of his friend, A. S. Oersted, who, together with his distinguished brother, H. C. Oersted (q. v.) had cemented a lifelong friendship with him. Cæ.'s studies were interrupted in 1801, when, on the bombardment of Copenhagen by Nelson and Parker, he and his friends served in the student-corps of volunteers. After this event, which roused the dormant patriotism of the nation, Cæ. found the study of law too irksome, and devoted all his energies to the cultivation of the history and mythology of his own country. In 1803, appeared his first collection of poems, including one longer dramatic piece, "St. Hans Aften-Spil," which attracted favorable notice for the lively fancy with which national habits and local characteristics were portrayed. The "Vaulunders Saga" in the "Poetiske Skrifter," published in 1805, and his "Aladdin's forunderlige Lampe," completed his success, and raised him to the rank of the first of living Danish poets; the former of these works having shewn a marvellous capacity for reflecting the dark and stern coloring of the old northern Sagas, while the latter gave evidence of a rich and genial poetic fancy. These early efforts were rewarded by the acquisition of a travelling pension, which enabled him to spend some years in visiting various parts of the continent, and becoming acquainted with the great literary celebrities of the day, such as the Weimar circle of whom Goethe was the head. During this period, Cæ. wrote his "Hakon Jarl," the first of his long series of northern tragedies, at Halle (1807; Eng. trans. by F. C. Lasceller, 1875), and his "Correggio," at Rome (1809; Eng. trans. by Theodore Martin, 1854). In 1810, Cæ. returned to Denmark, where he was hailed with acclamation as the greatest tragic poet Denmark had ever known; and having soon afterwards obtained the chair of æsthetics at the university, and received various substantial proofs of royal favor, he married, and settled in the capital, where his peace was, however, rudely disturbed by a literary feud with Baggesen, the Danish poet and critic, whose poetical supremacy had been superseded by that of Cæhenschläger. In 1819 appeared one of Cæ.'s most masterly productions, "Nordens Guder," and this and the numerous dramatic compositions written about the same period, shew that the severe criticism to which his writings had been exposed during the celebrated Baggesen quarrel, had corrected some of the faults, and lessened the self-conceit which had characterised his earlier works. His reputation spread with his increasing years both abroad and at home; and after having repeatedly visited the more southern parts of Europe, he went in 1829 to Sweden, where his arrival was welcomed by a public ovation; and after having received repeated marks of friendship from various sovereigns, he was honored in his own country by the celebration, in 1849, of a grand public festival held in the palace at Copenhagen. But this ovation was unfortunately followed in less than two months by his death, which took place in January, 1850. His funeral was kept as a national solemnity, and he was followed to the grave by a civic procession, which included members of every class of society, from princes to artisans. The fame of Cæ. will rest principally on his tragedies, of which he wrote 24, 19 of the number being on northern subjects. These were all composed originally in Danish, and re-written by himself in German. Besides those already referred to, the best are "Knud den Store," "Palnatoke," "Axel og Walborg," "Væringerne i Mikkilgord." His poems are for the most part indifferent, and his numerous prose writings deserve little notice. His Danish and German works amount in all to 63 volumes, to which must

be added 4 volumes of his "Erindringer," or "Autobiographical Recollections," published after his death.

**OEIL DE BŒUF**, a French term literally signifying ox's eye, applied in architecture to those small round or oval openings in the frieze or roof of large buildings, which serve to give light to spaces otherwise dark. The most famous is that in the anteroom (where the courtiers waited) of the royal chamber at Versailles, which gave name to the apartment. Hence the expression, *Les Fastes de l'Œil-de-Bœuf*—i. e., the history of the courtiers of the Grand Monarque, and by extension, of courtiers in general.

**OE'LAND**, a long and narrow island in the Baltic, lying off the eastern coast of Sweden, opposite to, and forming part of, the län of Kalmar, and at a distance of from 4 to 17 miles from the shore. It is 85 miles in length, and from 2 to 8 miles in breadth. The area is 688 square miles, and the pop. 45,000. The island, which is scarcely more than a lime cliff, is scantily covered with soil, but in some parts it is well wooded, and has good pasture-ground, which is turned to account by the islanders, who rear cattle, horses and sheep. In favorable seasons, barley, oats and flax yield good crops. The fishing is excellent all round the coasts. There are large alum-works on the island, and an extensive line of wind-mills along the range of the Alvar Hills, near which stands Borgholm (pop. 829), the only town on the island, the first foundations of which were laid in 1817. To the north of the island lies the steep but wooded island-cliff, the Jungfruen, or Blaukulla, which bears the mythical reputation of having been the scene of various deeds of witchcraft, and the favorite resort of wizards and witches.

**OELS**, a small town of Prussian Silesia, stands on a plain on the Oehra, or Oese, 16 miles east-north-east of Breslau. Its castle, built in 1558, is surrounded by ramparts and ditches. It contains a gymnasium, several churches, and other public edifices. Pop. (1871) 8124, who carry on manufactures of linens and cloth goods.

**CENANTHYLIC ACID** ( $C_{14}H_{22}O_2$ , HO) is one of the volatile fatty acids of the general formula  $C_nH_{2n}O_2$ . It is a colorless oily fluid, with an aromatic odor, lighter than water, and insoluble in that fluid, but dissolving readily in alcohol and ether. According to Miller ("Organic Chemistry," 2d ed. p. 385), it may be exposed to a cold of  $0^\circ$  without becoming solid; while it boils and may be distilled (with partial decomposition) at  $298^\circ$ . It is like many of the allied fatty acids) one of the products of the oxidation of Oleic Acid (q. v.) by nitric acid, and is likewise yielded by the action of nitric acid on castor oil, wax, and various fats. Its most characteristic salt is the cenanthylate of copper, which crystallises in beautiful green needles.

**CENOTHE'RA**, a genus of plants of the natural order *Onagraceæ* (q. v.), having four petals and eight stamens, the calyx-lobes 4-cleft, the segments reflexed; the capsule 4-valved, with many naked seeds. The *EVENING PRIMROSE* (*OR. biennis*), a native of Virginia, has been known in Europe since 1614, and is now naturalised in many parts of Europe and in some parts of Britain, on the banks of rivers, in thickets, on sandy grounds, &c. It is a biennial plant, and produces in the first year elliptic or obovate obtuse leaves, and in the second year a stem of  $1\frac{1}{2}$ —4 feet high, which bears at its summit numerous yellow flowers in a leafy spike. The flowers are fragrant in the evening. The root somewhat resembles a carrot in shape, but is short; it is usually red, fleshy, and tender; it is eaten in salads or in soups, and as a boiled vegetable. The plant is often cultivated for the sake of its large yellow flowers. Several other species of *Cenothera*, natives of North America, are occasionally cultivated in our gardens, and have eatable and pleasant roots.

**OERE'BRO**, an inland town of Sweden, capital of a län of the same name, is situated at the entrance of the Svart-Elf into the Heilmar Lake, 100 miles west of Stockholm. Pop. about 10,000. The town still retains many memorials of its early prosperity, when it was frequently the residence of the Swedish rulers, who found its central position in the more fertile southern portion of the kingdom favorable both in regard to safety and pleasantness of site. The old castle was built by Berge Jarl in the 13th c., and was in after-times frequently chosen as the seat of the national diets. O. has manufactories of wax-cloth, carpets, woollen goods, stock-

lugs, guns, and mirrors; and these industrial products, together with the minerals obtained from the neighboring silver, copper, and iron mines, are conveyed to Gothenburg and Stockholm by means of the extensive system of canals which connects the lakes of the interior with the maritime ports.

ØERSTED, Hans Christian, one of the most distinguished scientific discoverers and physicists of modern times, was born in 1777 at Rudkøbing, on the Danish island of Langeland, where his father practised as an apothecary. In 1794 he entered the university of Copenhagen, where he took the degree of doctor of philosophy in 1799, and soon afterwards became assistant to the professor of medicine, in which capacity he gave lectures on chemistry and natural philosophy. In 1806, after having enjoyed a travelling scholarship for several years, and visited Holland, the greater part of Germany and Paris, he was appointed extraordinary professor of natural philosophy in the university of Copenhagen. In 1812 he again visited Germany and France, after having published a manual under the title of "*Videnskaben om Naturens Almindelige Love*," and "*Første Indledning til den Almindelige Naturlære*" (1811). During his residence at Berlin, he wrote his famous essay on the identity of chemical and electrical forces, in which he first developed the ideas on which were based his great discovery of the intimate connection existing between magnetism and electricity and galvanism—a treatise which, during his residence in Paris, he translated into French, in conjunction with Marcel de Serres. In 1819, he made known these important truths in a Latin essay entitled "*Experimenta circa Efficaciam Conflictus Electrici in acum Magneticam*," which he addressed to all the scientific societies and the leading savans of Europe and America, and thus made good his claim to be regarded as the originator of the new science of electro-magnetism. This discovery, which formed one of the most important eras in the history of modern physical science, obtained for O. the Copley Medal from the Royal Society of England, and the principal mathematical prize in the gift of the Institute of Paris. The original and leading idea of this great discovery had been in his mind since 1800, when the discovery of the galvanic battery by Volta had first led him to enter upon a course of experiments on the production of galvanic electricity. The enunciation of his theory of electro-magnetism was followed by many important experiments in regard to the compression of water, and by numerous other chemical discoveries, among which we may instance his demonstration of the existence of the metal aluminium in alumina. The influence which O. exerted on the science of the day by his discoveries, was recognised by the learned in every country, and honors increased upon him with increasing years. He was corresponding member of the French Institute, perpetual secretary to the Royal Society of Sciences in Copenhagen, a knight of the Prussian Order of Merit, of the French Legion of Honor, and of the Danish Order of the Dannebrog, and a councillor of state. O.'s great object through life was to make science popular among all classes, in furtherance of which he wrote numerous works, contributed scientific papers to the newspapers and magazines of his own country and Germany, and in addition to his regular prelections in the university, gave courses of popular scientific lectures to the public including ladies. Among the works specially written to promote the diffusion of scientific knowledge, those best known are "*Aanden i Naturen*" (Køp. 1845), and "*Natur-lærens Mechaniske Deel*" (Køp. 1847), both of which have been translated into several other European languages. The majority of his more important physical and chemical papers are contained in Poggenorff's "*Annalen*," and were written by him in German or French, both of which he wrote with the same facility as his own language. At the close of 1850, a national jubilee was held in honor of the 50th anniversary of his connection with the university of Copenhagen—a festival which he did not long survive, as his death occurred at Copenhagen 9th March 1851. A public funeral, attended by all persons distinguished by rank or learning in the Danish capital, bore testimony to the respect and esteem with which he was regarded by his fellow-citizens, among whom his memory is cherished, not merely as one of the greatest scientific benefactors of his times, but as a man who contributed largely, by his eloquent and earnest advocacy of liberal principles, to the attainment of the high degree of constitutional freedom which Denmark now enjoys.

OE'SSEL, an island of Russia, in the Baltic, belonging to the government of Livonia, and lying across the mouth of the Gulf of Riga. It is about 60 miles in

length from north-east to south-west, and about 40 miles in greatest breadth, but the south-western end consists of a comparatively narrow peninsula. A narrow strait separates the north-eastern end from the island of Dago. The surface is undulating, broken by low hills, marshy, watered by numerous small streams, and well wooded. The coast is generally formed by high cliffs. The climate is milder than that of the neighboring continental districts. The rocks are generally calcareous, and the soil is in many places gravelly; the chief crops are wheat, oats, rye, barley, and peas. The rearing of cattle, horses, and sheep, and fishing, are, however, the principal occupations of the inhabitants. The seal-fisheries are of some importance. Pop. 46,000, mostly Lutheran. The only town is Arensburg, on the south-east coast, with a pop. (1867) of 3256. Many of the inhabitants of Arensburg are of German descent, as are the nobles and clergy of the island; but the peasantry are Estonian. The islanders of O. were in early times noted as pirates. The Danish king Waldemar conquered the island in the beginning of the 13th century. Albert von Buxhövdén, Bishop of Leal in Livonia, obtained it from Denmark in 1397, in order that he might reduce its inhabitants to subjection, and convert them to Christianity. Being partly subdued by the Teutonic Knights, it remained for more than 300 years under its bishops, the seat of the bishopric being transferred to the island. The last bishop sold it to Denmark in 1559. It remained a Danish province till 1645, when it was given up to Sweden, and in 1721, fell into the hands of Russia.

**ŒSOPHAGUS** (Gr. *ēto*, to convey, and *phagein*, to eat), or Gullet, a membranous canal, about nine inches in length, extending from the pharynx to the stomach, and thus forming a part of the alimentary canal. It commences at the lower border of the cricoid cartilage of the larynx, descends in a nearly vertical direction along the front of the spine, passes through an opening in the diaphragm, and thus enters the abdomen, and terminates in the cardiac orifice of the stomach opposite the ninth dorsal vertebra. It has three coats—viz., an external or muscular coat (consisting of two strata of fibres of considerable thickness—an external, longitudinal, and an internal, circular); an internal or mucous coat, which is covered with a thick layer of squamous epithelium; and an intermediate cellular coat, uniting the muscular and mucous coats. In this tissue are a large number of œsophageal glands, which open upon the surface by a long excretory duct, and are most numerous round the cardiac orifice, where they form a complete ring.

The œsophagus is liable to a considerable number of morbid changes, none of which are, however, of very common occurrence.

The most prominent symptom of *Œsophagitis*, or *Inflammation of the Œsophagus*, is pain behind the shoulders, or behind the trachea or sternum, augmented in deglutition, which is usually more or less difficult, and sometimes impossible. The affection is regarded as a very rare one, unless when it originates from the direct application of irritating or very hot substances, or from mechanical violence—as, for instance, from the unskilful application of the stomach-pump or probang. Dr Copland, however, is of opinion that it is not unfrequent in children, particularly during infancy, and observes that “when the milk is thrown up unchanged, we should always suspect the existence of inflammation of the œsophagus.” The ordinary treatment employed in inflammatory diseases must be adopted; and if inability to swallow exists, nourishing liquids, such as strong beef-tea, must be injected into the lower bowel.

*Spasm of the Œsophagus*—a morbid muscular contraction of the tube, producing more or less difficulty of swallowing—is a much more common affection than inflammation. The spasm generally comes on suddenly during a meal. Upon an attempt to swallow, the food is arrested, and is either immediately rejected with considerable force, or is retained for a time, and then brought up by regurgitation; the former happening when the contraction takes place in the upper part of the canal, and the latter when it is near the lower part. In some cases, solids can be swallowed, while liquids excite spasm; while in other cases the opposite is observed; but in general either solids or liquids suffice to excite the contraction, when a predisposition to it exists. The predisposition usually consists in an excitable state of the nervous system, such as exists in hysteria, hypochondriasis, and generally in a debilitated condition of the body. An attack may consist of a single paroxysm, lasting only a few hours, or it may be more or less persistent for months or even

years. The treatment must be directed to the establishment of the general health, by the administration of tonics and anti-spasmodics, by attention to the bowels and the various secretions, by exercise in the open air, the shower-bath, a nutritious diet, &c. ; and by the avoidance of the excessive use of strong tea, coffee, and tobacco. Care must also be taken not to swallow anything imperfectly masticated or too hot ; and the occasional passage of a bougie is recommended. Brodie relates a case that ceased spontaneously on the removal of bleeding piles. Strychnia is deserving of a trial when other means fail ; and if the affection assume a decidedly periodic form, quinia will usually prove an effectual remedy.

*Paralysis of the Œsophagus* is present in certain forms of organic disease of the brain or spinal cord, which are seldom amenable to treatment, and is often a very important part of the palsy that so frequently occurs in the most severe and chronic cases of insanity. In this affection there is inability to swallow, but no pain or other symptom of spasm ; and a bougie may be passed without obstruction. The patient must be fed by the stomach-pump, and nutrient injections of strong beef-tea should be thrown into the lower bowel.

*Permanent or Organic Stricture of the Œsophagus* may arise from inflammatory thickening and induration of its coats, or from scirrhus and other formations, situated either in the walls of or external to the tube. The most common seat of this affection is at its upper part. The symptoms are persistent and gradually increasing difficulty of swallowing, occasionally aggravated by fits of spasm ; and a bougie, when passed, always meets with resistance at the same spot. When the contraction is due to inflammatory thickening, it may arise from the abuse of alcoholic drinks, or from swallowing boiling or corrosive fluids ; and it is said that it has been induced by violent retching in sea-sickness. If unrelieved, the disease must prove fatal, either by ulceration of the tube around the seat of the stricture, or by sheer starvation. When the affection originates in inflammation, some advantage may be derived from a mild course of mercury, occasional leeching, and narcotics ; and especially from the occasional passage of a bougie, of a ball-probe (an ivory ball attached to a piece of whalebone), or of a piece of sponge moistened with a weak solution of nitrate of silver. If it is dependent upon malignant disease, and the tissues have become softened by the infiltration of the morbid deposit, the bougie must be directed with the greatest care through the stricture, as a false passage may be easily made into important adjacent cavities.

*Foreign bodies* not very unfrequently pass into the œsophagus, and become impacted there, giving rise to a sense of choking and fits of suffocative cough, especially when they are seated in its upper part. They may not only cause immediate death by exciting spasm of the glottis, but if allowed to remain, may excite ulceration of the parts, and thus cause death by exhaustion. If the body is small and sharp (a fish-bone, for example), it may often be got rid of by making the patient swallow a large mouthful of bread ; if it is large and soft (such as too large a mouthful of meat), it may generally be pushed down into the stomach with the probang ; while large hard bodies (such as pieces of bone) should be brought up either by the action of an emetic, or by long curved forceps. If the offending body can neither be brought up nor pushed down, it must be extracted by the operation of *Œsophagotomy*—an operation which can only be performed when the impacted body is not very low down, and which it is unnecessary to describe in these pages.

**CESTRIDÆ**, a family of dipterous insects, having a mere rudimentary proboscis or none, the palpi also sometimes wanting, and the mouth reduced to three tubercles ; the antennæ short and enclosed in a cavity in the forepart of the head ; the abdomen large. They are generally very hairy, the hair often colored in rings. They resemble flesh flies in their general appearance, and are nearly allied to *Muscidæ*. The perfect insect is very short lived. The females deposit their eggs on different species of herbivorous mammalia, each insect being limited to a particular kind of quadruped, and selecting for its eggs a situation on the animal suitable to the habits of the larvæ, which are different in different species, although the larvæ of all the species are parasites of herbivorous quadrupeds. The characters and habits of some of the most notable species are described in the article *BOT.* Animals seem generally to have a strong instinctive dread of the O. which infest them.

**OFFA'S DYKE**, a remarkable relic of antiquity, an entrenchment extending along the whole border of England and Wales, from the north coast of Flintshire,



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on the estuary of the Dee, through the counties of Denbigh, Montgomery, Salop, Radnor, and Hereford, into Gloucestershire, where its southern termination is near the mouth of the Wye, in the grounds of Sedbury Park, which overlook the estuary of the Severn. In some places, it is nearly obliterated by cultivation; in others, it is of considerable height, although its appearance nowhere indicates that it can ever have been of much value as a rampart. It is therefore generally supposed to have been chiefly intended as a line of demarcation. Nearly parallel with it, but at a distance varying from a few hundred yards to three miles, on the eastern or English side of it, is *Watt's Dyke*, a similar relic of antiquity, which, however, seems never to have been so great a work, and is now in many places much obliterated. It has been conjectured that the space between them was neutral ground where the Anglo-Saxons and Welsh met for trading or other purposes. The principal dyke is ascribed by tradition to Offa, king of Mercia, who reigned in the 8th c.; but this is matter of tradition, and not of history.

**OFFENBACH**, Jacques, a composer of dramatic music, who enjoys high popularity over the continent, of German birth, but a naturalised Frenchman. He was born in 1819, became *chef d'orchestre* in the Théâtre Français in Paris in 1847, and afterwards manager of the Théâtre des Bouffes-Parisiens. He has composed a vast number of light, lively operettas, "*Le Mariage aux Lanternes*," "*La Fille d'Ezondo*," &c., perfect as musical trifles; but the productions by which he is best known are a series of *bouffonneries musicales*, or barlesque operas, including "*Orphée aux Enfers*," "*La Belle Hélène*," "*La Barbe Bleue*," "*La Grande Duchesse*," "*Geneviève de Brabant*," and "*Roi Carotte*," composed with the rather questionable aim of parodying music of a more serious description. The high public favor accorded to his works has of late years extended to England.

**O'FFENBACH**, a manufacturing town of Hesse-Darmstadt, on the south bank of the river Main, within the domains of the Princes of Isenburgh-Birstein, 4 miles south-east of Frankfurt. Pop. (1870) 22,691. O. is pleasantly situated in one of the richest parts of the valley of the Main, and is one of the most important manufacturing towns in the province. Among the industrial products, its carriages have acquired a pre-eminent character for excellence; and next to these, stand its book-bindings, articles of jewellery, gold and silver goods, carpets, and silk fabrics. It has also good manufactories of wax-cloth, papier-mâché snuff-boxes, tin-lacquered wares, umbrellas and parasols, wax-candles, leather, hats, tobacco, sugar, and gingerbread and spiced cakes. O. has several churches, and a Jewish synagogue. The palace is the winter residence of the Isenburgh-Birstein family, to whom the old castle, now in ruins, also belongs. A pontoon-bridge across the river, and a railway to Frankfurt, facilitate intercommunication, and tend materially towards the maintenance of its active trade.

**OFFENCES AGAINST RELIGION, Public Peace, &c.** See **RELIGION, PEACE, &c.**

**OFFER AND ACCEPTANCE** is one mode of entering into a contract of sale. At an auction, the highest offer is generally accepted as a matter of course; and when accepted, the contract is completed. An offer is often made by letter from one merchant to another to buy or sell goods. In such a case, the party offering is bound to wait until he gets an answer by return of post or messenger; for until then the offer is supposed to be continuously made. But if A offer to B personally to sell, and B ask time to consider for a day, or any given time, A is not bound to wait a single moment, according to English law, and may withdraw at any time from the offer, because he had no legal consideration for waiting; whereas, in Scotland, in the same circumstances, A would be bound to wait the time agreed upon.

**OFFERING.** Under the head **FIRST-FRUITS** (q. v.) have been described the various offerings prescribed in the Jewish law. We shall have occasion to consider, under the head of **SACRIFICE** (q. v.), some further questions connected with the subject of offerings in public worship. In the Christian community there appears to have existed, from the earliest times, a practice of making voluntary offerings, for purposes not directly connected with public worship. See **OFFERTORY**.

**O'FFERTORY** (Lat. *offertorium*, from *offero*, I offer) is the name given to that portion of the public liturgy of the Roman Catholic Church with which the eucharistic service, strictly so called, commences. In the Roman Liturgy, it consists of one

or two verses from some book of Scripture, generally from the Old Testament, but sometimes also from the Epistles. In the Ambrosian Liturgy it consists of a prayer, similar in form to the *collect* or *secret* of the mass; and in both, this recital is followed by the preparatory offering up of the bread and wine, accompanied by certain ceremonies and forms of prayer.

This offering of the bread and wine in the public service became, from a very early period, the occasion of a voluntary offering, on the part of the faithful; originally, it would seem, of the bread and wine designed for the eucharistic celebration and for the communion of the priest and the congregation, sometimes even including the absent members, and also for the *agape*, or common sacred feast, which accompanied it. That portion of the offerings which remained in excess of what was requisite for these purposes was applied to the relief of the poor, and to the support of the clergy. These offerings were ordinarily made by the faithful in person, and were laid upon the altar; and the Ambrosian rite still preserves this usage in a ceremonial which may be witnessed in the cathedral of Milan. By degrees, other gifts were superadded to those of bread and wine—as of corn, oil, wax, honey, eggs, butter, fruits, lambs, fowl, and other animals; and eventually of equivalents in money or other objects of value. The last-named class of offerings, however, was not so commonly made upon the altar and during the public liturgy, as in the form of free gifts presented on the occasion of other ministerial services, as of baptism, marriages, funerals, &c.; and from this has arisen the practice in the Roman Catholic Church of the mass-offering, or *honorarium*, which is given to a priest with the understanding that he shall offer the mass for the intention (whence the *honorarium* itself is often called an “intention”) of the offerent. In some places, however, and among them in some parts of Ireland, offerings “in kind” are still in use, not indeed in the form of the ancient offertory, but in the shape of contributions of corn, hay, &c., at stated seasons, for the use of the parochial clergy. At weddings also, and in some places at funerals, offerings in money are made by the relations and friends of the newly married or of the deceased. In the Liturgy of the English Church allusion is made to the practice of oblations, and some of the recent controversies have turned upon the revival of the “offertory,” which has found some advocates.

**OFFICE**, The Divine (Lat. *officium*, duty), is the name popularly given to the CANONICAL HOURS (q. v.) prescribed to be read each day by bishops, priests, deacons, and sub-deacons in the Roman Catholic Church. Under the head **BREVARY** will be found a general description of the contents and the arrangement of that great service-book. The special portions assigned for any particular day constitute what is called the divine office for that day; and each person who is bound in virtue of his order to recite the Breviary, is obliged, under pain of sin, to read, not merely with the eye, but with distinct, although it may be silent, articulation, each and all these portions. The adjustment of the portions of the office of each day, the combination of the “ordinary” portions which are read every day in common, with the parts “proper” for each particular day, is a matter of considerable difficulty, and is regulated by a complicated system of RUBRICS (q. v.).

**OFFICE**, Holy, Congregation of the. In the article **INQUISITION** (q. v.) it has been explained that that tribunal is sometimes called by the name Holy Office. That title, however, properly belongs to the “Congregation” at Rome, to which the direction of the tribunal of the Inquisition at Rome is subject. This Congregation was established by Paul III. in 1542, and its organisation was completed by Sixtus V. It consists of twelve cardinals, a commissary, consulters, and qualifiers, whose duty it is to examine and report on each case for the information of the cardinals. In the most solemn sessions of the Holy Office the pope himself presides in person. The Holy Office decides questions of heresy, inquires into crimes against faith, and judges ecclesiastical offences, especially in the administration of the sacraments. In the present condition of the papal court, the action of the H. O. is much restricted.

**OFFICE COPY** is a copy made of a document by some officer of a court in whose custody the document is; and in general such copies are receivable in evidence, without further proof in the same court, but not in other courts, unless some statute makes them evidence.

**OFFICERS**, Military and Naval.—*Military Officers* are combatant and non-combatant, the latter term including paymasters, medical officers, commissariat, and

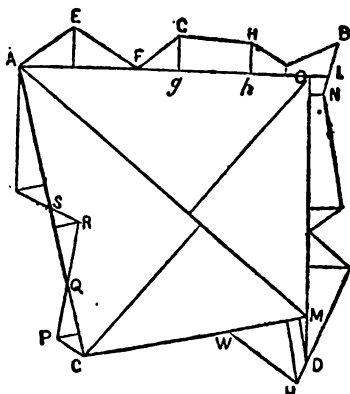
other civil officers. The great divisions of rank are commissioned, warrant, and non-commissioned officers. Commissioned officers are those holding commissions from the crown, or a lord-lieutenant, and comprise all holding the rank of ensign, or corresponding or superior rank. Divided by duties, they are Staff Officers (see *STAFF*), or Regimental Officers (see *REGIMENT*); divided by rank, General Officers (q. v.), Field-Officers (q. v.), and troop or company officers. The last are captains, lieutenants, and sub-lieutenants, and, except, in the cavalry, are unmounted. The different systems of promotion for officers, and especially the intricacies of the late purchase system, will be explained under *PROMOTION, ARMY, and PURCHASE SYSTEM*. The only warrant officers in the army are Master-gunners (see *GUNNER*) and Schoolmasters. Non-commissioned officers are described under that heading.

*Officers, Naval*, are commissioned, warrant, and petty officers. Commissioned officers are admirals, captains, commanders, lieutenants, and sub-lieutenants, described under their respective titles. Warrant Officers (q. v.) are boatswains, carpenters, gunners, and one class of engineers. Petty officers will be described under that heading, and constitute a very important portion of the management in a ship-of-war.

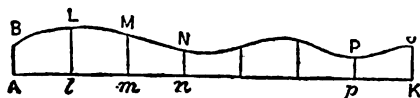
*OFFICIAL ASSIGNEE*, in English Law, is an officer of the Bankruptcy Court, in whom a bankrupt's estate vests the moment an adjudication of bankruptcy is made. He is the manager of the property, and can sell the estate under the directions of the court in urgent cases, such as where the goods are perishable; but in general, he is assisted in the management by the creditors' assignees, who are selected from the body of creditors by the other creditors' votes. The official assignee is appointed by the Lord Chancellor, being selected from the body of merchants, brokers, or accountants. He is bound to find security to the extent of £6000. He is prohibited from carrying on trade on his own account. The salary is £1000.

*OFFICIAL PLANTS* (Lat. *officina*, a shop) are those medicinal plants which have a place in the pharmacopœias of different countries, and which are therefore sold—or some of their products or preparations of them—by apothecaries and druggists. The medicinal plants cultivated to any considerable extent are all official, but many are also official which are not cultivated. See *MEDICINAL PLANTS*.

*OFFSETS*. Let AEF..... B..... D..... C be a field with very irregular sides;



take the points A, O, M, C at or as near the corners as convenient, the object being to enclose as much of the field as possible within the quadrilateral AOMC; and for this purpose it is sometimes necessary, as in the present case, to include a corner (as SRQ) which is outside the field. The area AOCD is found by means of the diagonal AM, and the perpendiculars on it from C and O. The area AEFG.....BL is found by dividing it into triangles and trapezoids by means of perpendiculars (to which the term *offsets* was originally applied, though it now denotes the irregular area before mentioned) from the corners E, G, H, &c. (see TRIANGLE and TRAPEZOID), and adding together the areas of the separate figures AEF, FGH, GHh, &c. Similarly the areas of OLN....D and MDUW are found. To the sum of these must be added the areas of the triangles ATS, QPC, diminished by the area of SRQ, and the result is the whole area of the field. If the offset have no distinct corners, as (fig. 2)



ABLMN....OK, then the base AK is divided into equal parts by perpendiculars ABL, Mm, Nn, &c., and the area of the offset is found approximately as follows: the whole offset =  $ABL + LMm + MmNn + \&c. + PpOK = A \times \frac{1}{2} (AB + L) + lm \times \frac{1}{2} (L + Mm) + mn \times \frac{1}{2} (Mm + Nn) + \dots + pK \times \frac{1}{2} (pP + OK)$  (since the divisions of the base are equal)  $A \times \frac{1}{2} (AB + 2L + 2Mm + 2Nn + \dots + 2pP + OK)$   

$$= A \times \left\{ \frac{AB + OK}{2} + L + Mm + Nn + \dots + Pp \right\};$$
 i. e., the area of an offset is

found approximately by adding the intermediate perpendiculars to the semi-sum of the first and last, and multiplying the sum total by the length of a division of the base, the divisions being equal; and the greater the number of perpendiculars, the nearer the result is to the true area.

**OFFSET**, or *Set-Off*, the splay or sloping part of a wall, &c., joining parallel surfaces when the upper face recedes from the lower. This frequently occurs on buttresses. The O. is usually protected with dressed stones, having a projection or drip on the lower edge to prevent the rain from running down the wall.

**OFFSETS**, a term used by gardeners to designate the young bulbs, which springing from the axils of the scales of a bulb (q. v.), grow beside it, exhausting its strength, but which serve for the propagation of the plant. A crop of shallots, or of potato onions, consists entirely of the offsets of the bulbs planted in spring; although the term is not commonly used except as to bulbous-rooted plants prized for the beauty of their flowers.

**O'GDENSEBURG**, a city and port of entry in New York, U.S., on the south bank of the river St Lawrence, at the mouth of the Oswegatchie, 210 miles north-west of Albany, and at the western terminus of the Northern Railway. It has a large lake and river trade, mills and factories, custom-house, town-hall, &c., and a steam-ferry to Prescott, Canada. Pop. in 1960, 7410; in 1870, 10,076; in 1830, 10,341.

**OGEE'**, a moulding consisting of two curves, one concave and the other convex. It is called (in Classic Architecture) *Cymatium*, or *Cyma Reversa* (see **MOULDING**). The ogee is also much used in Gothic architecture. An arch having each side formed with two contrasted curves is called an ogee arch.

**O'GHAMS**, the name given to the letters or signs of a secret alphabet long in use among the Irish and some other Celtic nations. Neither the origin nor the meaning of the name has been satisfactorily explained.

The alphabet itself is called *Bethluatinin*, or *Bethluis*, from its first two letters, "b," called "*beith*" (birch), and "l," called "*luis*" (quicken). Its characters are lines, or groups of lines, deriving their significance from their position on a single

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Ogyg.a

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stem or chief line—over, under, or through which they are drawn either straight or oblique. In some cases, the edge of the stone or other substance on which the Oghams are incised, serves the purpose of the stem or chief line. About eighty different forms of the alphabet are known. The sign for the diphthong “*ea*” is said to be the only one which has been observed on ancient monuments. It is added that the sign for “*ui*” sometimes stands for “*y*,” that the sign for “*ia*” sometimes stands for “*p*,” and that the sign for “*ae*” stands also for “*x*,” for “*ce*,” for “*ch*,” for “*ach*,” and for “*uch*.”

Ogham inscriptions generally begin from the bottom, and are read upwards from left to right to the top, when they are carried over, and run down another side or angle. Most of those which have been read give merely a proper name with its patronymic, both in the genitive case. The stones on which Oghams are cut would seem, for the most part, to have been sepulchral. Oghams are of most frequent occurrence in Ireland, where they are found both written on books and inscribed on stones, metals, or bones. The Oghams on stones are most numerous in the counties of Kerry and Cork. A few Ogham inscriptions on stones have been discovered in Wales—as at St Dogmael’s, in Pembrokeshire; near Margam, in Glamorgan-shire; and near Crickhowel, in Brecknockshire. There are a few in Scotland, as on the Newton Stone and the Logie Stone in Aberdeenshire, on the Golepie Stone in Sutherland, and on the Bressay Stone in Shetland. One has been found in England—at Fardel, in Devonshire. Oghams have been observed on an ancient MS. of Priscian, which belonged to the famous Swiss monastery founded in the 7th c. by the Irish missionary, St Gall (q.v.).

The difficulties of deciphering Ogham inscriptions cannot be said to have been as yet altogether overcome. It is confessed by the most learned and judicious of Ogham scholars, the Rev. Charles Graves, D.D., of Trinity College, Dublin, that the nature of the character is such that it does not at once appear which, of four different ways of reading, is the right one; that the words being written continuously, as in ancient MSS., there is great chance of error in dividing them; and that the Celtic names inscribed are generally Latinised in such a manner as not readily to be recognised.

The old school of Irish antiquaries contended that the Oghams were of Persian or Phœnician origin, and were in use in Ireland long before the introduction of Christianity. But this theory is now generally discarded, as not only unsupported but as contradicted by facts. A comparison of the Ogham alphabet, with the alphabets of Persepolis and Carthage, shews that there is no likeness between them. The great majority of Ogham monuments, it has been observed, bear more or less distinct marks of Christian hands. Several are inscribed with crosses, as old, to all appearance, as the Oghams themselves. Many stand in Christian burying-grounds, or beside Christian cells or oratories. Some still bear the names of primitive saints. At least one is inscribed with a Christian name; and some of the inscriptions betray an undeniable knowledge of Latin. At the same time, it has been argued by one of the most learned of Celtic philologists, Mr Whitley Stokes, that “the circumstance that genuine Ogham inscriptions exist both in Ireland and in Wales which present grammatical forms agreeing with those of the Gaulish linguistic monuments, is enough to shew that some of the Celts of these islands wrote their language before the 5th c., the time at which Christianity is supposed to have been introduced into Ireland.” It has been observed by Dr Graves, on the other hand, that there are many points of resemblance between the Oghams of the Celts and the Runes of the Norsemen; and, indeed, one Irish MS. asserts that the Oghams came to Ireland from Scandinavia:

“Hither was brought, in the sword sheath of Lochlan’s king,  
The Ogham across the sea. It was his own hand that cut it.”

The Ogham is said to have been in use so recently as the middle of the 17th c., when it was employed in the correspondence between King Charles I. and the Earl of Glamorgan.

The best account of Oghams is in the papers in the “Transactions of the Royal Irish Academy,” by Dr Graves, now bishop of Limerick, vol. iv. pp. 16, 173, 183, 284; vol. v. pp. 234, 401; vol. vi. pp. 71, 209, 243, where also are some papers of value on the same subject by Mr Samuel Ferguson; and the “Catalogue of the Museum of the Royal Irish Academy,” pp. 134–140; and in Mr Whitley Stokes’s “Three

*Irish Glossaries*, pp. 55-57, compared with Thomas Innes's "Critical Essay on the Ancient Inhabitants of Scotland," vol. ii. pp. 440-466. The reader may also consult with advantage Aslie's "Origin and Progress of Writing," Petrie's "Essay on the Round Towers of Ireland," John Stuart's "Sculptured Stones of Scotland," and Ware's "Antiquities of Ireland." Ogham inscriptions may be seen in the Museum of the Royal Irish Academy at Dublin, in the Museum of the Society of Antiquaries of Scotland at Edinburgh, and in the British Museum at London.

**O'GIVES**, the arches in pointed Gothic vaulting which cross the vault diagonally from one angle to another.

**O'GOBAI**, a large river of Western Africa, which falls into the sea by many mouths, between a lat.  $0^{\circ} 40'$  and  $1^{\circ} 20'$ . Its delta is very large, and forms a most complicated network of rivers, flowing amidst a dense forest. The most northern mouth of the O. has long been known as the river Nazareth, and falls into a bay of the Atlantic, on the north of Cape Lopez. Another principal mouth, to the south of that far-projecting cape, is known as the Mexican; and the southernmost, which seems to be the largest of all, is the river Fernand Vas. These were regarded as distinct and large rivers, till the explorations of Du Chaillu revealed their relation to each other, and to the main river Ogobai. The extent of the basin of the O., its sources, and the length of its course, are yet unknown, but it may be deemed certain that it is by far the largest river of Western Africa between the Niger and the Congo. For almost all our knowledge of the O., and the country through which it flows, we are indebted to Du Chaillu, although, in the interval between his first and second visits, the lower part of its course was partially explored by two French expeditions. Not far from its mouth, the Fernand Vas is joined by the Rembo, also a large river, although much inferior in size to the O., which, after flowing in a south-westerly course from the interior, bends northward, and pursues a course nearly parallel to the coast for about fifty miles, the narrow peninsula between the river and the sea being a sandy and grassy prairie, with scattered groups of fine trees, frequented by herds of the Nlarc (q. v.), or wild ox of Western Africa and of antelope. The dense forests of the O. are the main haunts of the Gorilla (q. v.), and of several other anthropoid apes, discovered by Du Chaillu, among which are the Nest-building Apes (q. v.). Prodigious flocks of marabouts also come to lay their eggs on these prairies, and in the wet season, numerous pools are formed, which teem with fish. The forest-regions produce few of the mammalia, herbivorous and carnivorous, so abundant in other parts of Africa; and even birds are few. About 150 miles from the mouth of the O., the main stream is formed by the junction of two rivers, the Okanda and the Ngouyal—the former, which is said to be the larger of the two, coming from the north-east; the latter, which alone was explored by Du Chaillu, from the south-east. This river, after a long course through the table-lands of the interior, bursts through the mountain-range which separates them from the level country of the coast; the possibility of navigation being here cut off by a magnificent fall, and still more magnificent rapid, in which the river rushes down a steep declivity through a rocky chasm. Both above and below the fall, however, it is quite suitable for navigation by steamers; but a great impediment to commerce, when commerce shall spring up in that region, will be found in the difficult bar at the mouth of the Fernand Vas. The rainfall on the upper parts of the O. is supposed to be very great. The observations of Speke and Burton on the eastern side of tropical Africa, and of Du Chaillu on the western, concur in shewing that this must be the case. Rainy and dry seasons alternate on both coasts, but as the traveller proceeds inland, rain becomes more frequent, falling almost every day, and it would seem at all seasons alike.

**OGY'GES**, the earliest king of Attica and Boeotia named in Greek legend. In his time (according to Larcher, about 1759 B.C.) a great flood took place, called the Ogygian Flood, which desolated all the lower districts of both countries, and destroyed their inhabitants. The different legends lead to the supposition that under O. an Egyptian colony came to Boeotia, and thence to Attica. From him Boeotia took the name of Ogygia.

**OGY'GIA**, a genus of Trilobites peculiar to the Llandello flags of the Lower Silurian period. Six species have been described.

Ohio  
Oidium

748

**OHIO**, one of the United States of America, lies between lat.  $38^{\circ} 17'$ — $41^{\circ} 54'$  n., and long.  $80^{\circ} 34'$ — $84^{\circ} 40'$  w.; 225 miles in extent from east to west, and nearly 300 miles from north to south; containing 39,964 square miles, or 25,576,960 acres; bounded n. by Michigan and Lake Erie, e. by Pennsylvania and Virginia, from which it is separated by the Ohio River, which also forms its southern boundary, separating it from Virginia and Kentucky, and w. by Indiana. The Ohio River forms its boundary for 436 miles, and its lake shore is 280 miles. The high table-lands hilly, and in parts mountainous regions of O., are drained by numerous rivers, among which are the Great and Little Miami, Scioto, and Muskingum, affluents of the Ohio; and the Maumee, Sandusky, Huron, Vermillion, Cuyahoga, and Ashtabula, which empty into Lake Erie. Drift formations prevail in the north, alluvium in the south, with extensive coal-measures, and limestone strata, shales, marls, and gypsum, giving the whole state a wonderful fertility. The coal-beds of Eastern Ohio cover 10,000 square miles, with abundant deposits of iron ore. In the north are valuable deposits of bluestone, a fossiliferous silty quartz, used for millstones. The salt produced in 1873 was reported at 4,154,187 bushels. Oil wells have also been opened, and 1,815,660 barrels of oil were refined in the state in 1873. The soil, rich everywhere, is so fertile in the river bottoms as to have borne heavy cereal crops fifty successive years without manuring; the climate is temperate, with a liability to a cold in winter reaching sometimes to  $20^{\circ}$  below zero. It is healthy, except lowlands liable to fever and ague. The forests are rich in oak, black walnut, maple, &c.; the chief agricultural productions are Indian corn, wheat, rye, oats, hay, sorghum, tobacco, hemp, peaches, apples, grapes, cattle, sheep, swine, the latter being one of its chief exports. The chief manufactures are iron, clothing, furniture, spirits, wines, cotton, and woollen. The wine called Catawba, produced upon the southern shore of Lake Erie, compares very favorably with the similar wines of the Rhine. Farms occupy 21,712,490 acres, with an average size of 111 acres. A large commerce is carried on by the Ohio River, the lakes, canals, and numerous railways. The state is organised in 89 counties. The chief towns are Cincinnati, Cleveland, Columbus (the capital), Sandusky, Zanesville, &c. In 1874, there were 170 national and 243 private and other banks. The state revenue in the year ending Nov. 15, 1874, amounted to 5,768,789 dollars. Among the state institutions are 4 lunatic asylums, asylums for deaf and dumb, blind, idiots, penitentiary, reformatories, &c. In 1870, there were 11,963 establishments for education, including 9 universities, 33 colleges, 11 theological institutions, 10 medical, and 11,458 public schools. The total attendance was 790,795. The state possesses many extensive libraries, and has 395 newspapers. In 1874, 4374 miles of railway were open for traffic.

O. was organised and admitted as a state in 1803. The population in 1800 was 45,865; (1820) 581,434; (1840) 1,519,467; (1860) 2,339,599, of whom 111,257 were Germans, 51,562 Irish, 36,000 English and Scotch; (1870) 2,565,260; (1880) 3,198,022.

**OHIO**, a river of the United States of America, called by the French explorers, after its Indian name, *la Belle Rivière*, next to the Missouri, the largest affluent of the Mississippi, is formed by the union of the Alleghany and Monongahela, at the western foot of the Alleghanies, at Pittsburgh, in Pennsylvania, and flows west-south-west 975 miles, with a breadth of 1200 to 3000 feet, draining, with its tributaries, an area of 214,000 square miles. In its course it separates the northern states of Ohio, Indiana, and Illinois from the southern states of Virginia, and Kentucky. The principal towns upon its banks are Cincinnati, Louisville (where there are rapids of 22 feet in a mile, with a steam-boat canal), Wheeling, Maysville, and Pittsburgh and Cairo at its source and mouth. It is navigable from Wheeling, 100 miles below Pittsburgh. The banks of the O. are generally high and terraced. It is often shallow and scarcely navigable, sometimes frozen, and subject to floods of 50 or 60 feet above low-water. Bordered by a rich country, and great deposits of coal and iron, it is the channel of a vast commerce, which it shares with its chief branches, the Tennessee, Cumberland, Wabash, Green, &c.

**O'HLAU**, Olau, or Olawa, a town of Prussian Silesia, 17 miles south-east from Breslau, on the right bank of the Ohlau, a branch of the Oder. O. is a station on the railway which connects Breslau and the north with Vienna. It is an ancient town, with a royal palace and an old castle. At the present day, it is a place of consider-

able industrial activity. Being the capital of a circle, it has numerous district courts and offices. Pop. (1875) 7968.

**OIDIUM**, an important genus of minute fungi of the section *Hyphomycetes*, growing on diseased animal and vegetable substances. They consist of minute tubular threads, forming flocks, white in some species, brightly colored in others, simple or irregularly branched, assuming in their upper part the form of strings of beads, which finally break up into elliptic spores. The species actually existing are probably much more numerous than those which have been fully ascertained. Among the most important of the vegetable parasites of man is *O. albicans*, which is found on the epithelium in the mouth and throat in the disease called *aphthæ*, or thrush, and on that of the throat in diphtheria, also sometimes in the nostrils, stomach, and intestines, on the ualls, the nipples, and other places. It is more common in children and in aged persons, than in those who are in the prime of life. It occurs frequently in the last stages of many diseases, when the mucous membrane is covered with nitrogenous decomposable matter. Indeed, it would seem that whatever may be the case as to other vegetable parasites, no species of *O. begins* its attack upon a perfectly healthy surface, either animal or vegetable; a diseased state of the tissue being to these fungi a necessary condition of vegetation, "just as the yeast-plant will not vegetate save in a fermentable fluid, that is, in a solution which, in addition to sugar, contains some decomposable albuminous matter." *O. albicans* appears to the naked eye as a white pasty substance, slightly elevated above the mucous membrane to which it adheres; but under the microscope, its filamentous structure is easily perceived. Its seat is at first on the upper surface of the epithelial cells, but its filaments soon penetrate deeply between them, and the upper epithelial layers are soon worn out, and thrown off by the rapid growth from below. However incapable the *O. albicans* may be of attacking a healthy surface, there can be no doubt that it greatly contributes to the extension of disease, and that it is very readily communicated from one patient to another when there is catarrh or other inflammatory affection of the mucous membrane.

Another species of *O.* which has attracted great attention is *O. Tuckeri*, regarded by many as producing the grape disease, which, several years ago, injured the vineyards of many parts of the world, but in accordance with the views already expressed, perhaps rather to be regarded as merely accompanying and extending the disease. It may probably be the case that over-cultivation of particular varieties of grape, and too long continued cultivation on the same ground, have so impaired the vigor and healthfulness of the plants, as to make them liable to the attacks of this parasite. *O. Tuckeri* makes its appearance at first in the form of a *mycelium* of webby, creeping, branching filaments, which send out upright or decumbent jointed stems. The bead-like joints of the stems become successively filled with spores, which are finally discharged in little clouds for the multiplication of the species. The grape disease was first observed in Kent, England, in the spring of 1845, on vines in the vineery of Mr Tucker. The ends of the young shoots assumed a crispy appearance, began to wither, and then dried up. The unripe grapes were next attacked, becoming covered with a grayish-white bloom, the skin of the grapes being destroyed, and they rotted and dried up. The disease rapidly spread over other English vine-ries; was observed about the same time in the vine-ries of Paris, and soon in the vineyards of almost all parts of France, Italy, Greece, Tyrol, and Hungary; finally, and in a slighter degree, affecting the vineyards of the Rhine. Its ravages extended to Algeria, Syria, Asia-Minor, and many other countries, among which is particularly to be noticed the island of Madeira, where it proved almost completely destructive to the grapes, and nearly put an end to the production of the celebrated Madeira wine. The importation of Madeira wine to Britain in 1831 amounted to 209,127 gallons; and in 1861, only to 28,749 gallons. It is probable that the complete isolation of the Madeira vineyards made the progress of the disease more rapid, and its results more complete than elsewhere, by causing a prevalence of the conditions favorable for it. No kind of vine escaped. The grape disease is first perceived in the leaves, which become whitish, in consequence of a mycelium spreading over the upper surface of the leaf. The leaves sometimes curl up, or they become black at the centre, the blackness extending towards the circumference, and finally they drop off. The plant, through loss of its leaves, now becomes more unhealthy; the shoots are attacked by the disease, the stalks of the bunches of grapes, and the grapes them-



selves. The parasite penetrates into the young wood, the shoots are covered with spots and blotches of a reddish brown, or even black color, and look as if a red-hot iron had been applied to them. Sometimes they secrete a clammy luodorous fluid all over their surface; and in many cases they wither from the top down half their length. The affected grapes very often first exhibit the disease in a single whitish spot on a single grape of a bunch, which enlarges by radiating irregularly. If in a bunch there is one abortive grape, it often shews signs of the disease, whilst the rest remain free. The creeping branches of the mycelium are fixed upon the skin of the grape by rootlets, which do not penetrate into the juicy pulp. The mycelium sends up vertical fertile branches of nearly equal height, densely aggregated, and forming a velvet-like mass. The extremities of these become beaded; and at last the uppermost cell or bead increases in volume, becomes detached, and is carried off by some slight breath of air, to multiply the species by the dispersion of its spores. The other bead-like cells follow in succession.

Various means were resorted to for the prevention and cure of the grape disease. The application of pulverised sulphur was found useful, the fungus withering and drying up when brought into contact with a minute particle of sulphur. The application of sulphur must be frequent, as portions of the mycelium and some of the spores always escape. The use of sulphur was the chief means of checking the spread of *O. lu* French and other European vineyards; it became general in the south of France and in Italy; and in consequence of its national importance, the duty on sulphur was reduced by the French government. Hydrosulphide of lime was also applied to vines with very beneficial effect. It is prepared by thoroughly mixing 68 ounces of flowers of sulphur with the same quantity of slaked lime, adding three or four quarts of water, boiling for about ten minutes, allowing it to settle, and decanting the clear liquor. When it is to be used, one quart is mixed with 100 quarts of water, and it is poured over the vines.

**OIL-CAKE**, the cake which remains in the press, when seeds are crushed to express the oil which they contain. Oil-cake still retains a portion of the oil of the seed, along with almost all its other constituents, and is valuable either for feeding cattle or for manure. *Linseed-cake* is so much more largely used in Britain than any other kind, that the name oil-cake is in general exclusively appropriated to it, the other kinds being known as *Rape-cake*, *Poppy-cake*, *Hemp-cake*, *Colza-cake*, &c., according to the plant from the seed of which they are produced. The use of oil-cake for feeding cattle has very much increased of late years, and it is an article of commercial importance. Large quantities are imported into Britain from different parts of the continent of Europe, and from North America. But *English Linseed-cake*—cake made at oil-mills in England, mostly from imported seed—is preferred to any other, because heat not being so freely applied during the expression of the oil, more oil is left in the cake, and also because foreign cake often suffers from dampness both before and during the sea passage. Besides the oil which remains in it, linseed-cake contains from 24 to 33 per cent. of nitrogenous substances or protein compounds, which make it very valuable both for feeding cattle and for manure. The value of linseed-cake for feeding is greater than that of any kind of grain or pulse.—*Rape-cake* is, next to linseed-cake, the kind of oil-cake best known in Britain. It is much cheaper than linseed-cake, but is not relished by cattle, having a bit taste, and a tendency to become rancid. Sheep, however, eat it readily, and it is often employed for fattening them. It is also often ground to a coarse powder (*rapedust*), and used as a manure. Its fertilising power is great, and it is used by the Flemish farmers as guano now is by those of Britain.—*Cotton Seed-cake* is much used as a manure in some parts of North America.—*Cocoa-nut-cake* is used in the south of India, both for feeding cattle and for manure.—Other kinds of cake are noticed, if sufficiently important, under the plants from which they are derived. Their properties are generally similar to those of linseed-cake, although the pungency of some, as *Mustard-cake*, renders them unsuitable for feeding cattle. See **OIL**.

**OIL-FUEL**. A great incentive has been given by the discovery of copious wells of petroleum (see **OIL WELLS AND OIL-TRADE**) to the invention of some mode of using oil as a fuel for furnaces and stoves. Such attempts had often been made before; but they assume a new aspect now that oil has become so much cheapened. Nearly half the carrying capacity of European steam-ships, and more than half in those

which make long voyages, is taken up with the stowage of coal. Petroleum (q. v.), if wholly burned, and all the heat utilised, gives out much more heat than an equal weight of anthracite or steam coal.

Mr Richardson made some experiments for the government at Woolwich in 1866. His grate consisted of two iron boxes, one within the other; the inner contained oil, and the space between the two boxes contained water. When the water boiled by the application of heat, and the oil began to arise in vapor, a jet of steam was admitted to mix with the vapor. The steam was found to assist the perfect combustion, so as to avoid the production of smoke. One object was, to ascertain whether the refuse of the stills, resulting from the distillation of shale oil, could be made available as furnace-fuel. The government published a Report of the Experiments, with diagrams, in 1866. It was considered that petroleum, used instead of coal as fuel, (1) raises steam more rapidly; (2) requires a smaller furnace and boiler; (3) maintains a more continuous fire and heat; (4) affords means of varying the intensity of the fire more quickly; (5) is extinguished instantly by turning off the oil and keeping on the steam; (6) produces no smoke, ash, or dust; (7) dispenses with some of the staff of coalers and stokers; (8) economises space for coal-bunkers; (9) reduces the dead-weight carried by the ship; (10) occasions no loss of heat by opening furnace-doors; (11) keeps the engine-room clean and comparatively cool; and (12) admits of the furnace-fires being lighted much more quickly. A modified form of oil-furnace was tried at Woolwich by Mr Richardson, in 1867, not only with refined petroleum, but with the same oil in its crude form, shale-oil, naphthaline, creosote, grease, and residuum tar.

Experiments have been conducted with the same object in America. Mr Isherwood, chief of the bureau of steam-engineering in the United States navy, conducted a series of experiments in 1867, on Colonel Foote's furnace for burning petroleum, and fitted up the iron gunboat *Palos* for this purpose, under the direction of a board of engineering officers. Most of the advantages claimed for Richardson's apparatus seem to be equally applicable to this of Foote.

There is a petroleum furnace by Meers Wise and Field, patented in 1867, in which the oil is injected into the furnace by the pressure of superheated steam. There are many other forms of oil-furnace by Hill, Stevens, Sim, Burff, the American Petroleum Light Company, &c.

Many of the advantages of oil-fuel already mentioned are pretty generally conceded; but the questions of *safety* and *cheapness* are not yet settled.

OILLETS, or Cèllets, small openings, often circular, used in mediæval buildings for discharging arrows, &c., through.

OIL MILL. See OILS.

OIL PALM (*Elaeis*), a genus of palms, of the same tribe with the cocoa-nut palm. The best known species, the O. P. of tropical Africa, sometimes attains the height of 60–80 feet. The stems are thickest in the middle, tapering chiefly upwards. The leaves are pinnate, their footstalks spiny. The flowers have a strong peculiar smell, like that of anise or chervil. The fruit forms an immense head, like a great pine-apple, consisting of a great number of bright orange-colored drupes, having a thin skin, an oily pulp, and a hard stone. The pulp of the drupes, forming about three-fourths of their whole bulk, yields, by bruising and boiling, an oil, which when fresh has a pleasant odor of violets, and when removed into colder regions acquires the consistency of butter. This oil is now very largely imported from tropical Africa into Britain, and is much used for many purposes, as for making candles, toilet soaps, &c., and for lubricating machinery and the wheels of railway carriages. When fresh, it is eaten like butter. See OILS. The nut was formerly rejected as useless after the oil had been obtained from the fruit; but from its kernel a fixed oil is now extracted, called PALM-NUT OIL; which is clear and limpid, and has become to some extent an article of commerce. The O. P. abounds in mangrove swamps, but is also a conspicuous feature of the landscape on sandy coasts in the tropical parts of Western Africa. It yields from its trunk abundance of a pleasant and harmless beverage, which, however, becomes intoxicating in a few hours; called *Ma oea* in Angola, and much used there as an alcoholic stimulant. The unripe nuts of the O. P. are used in some parts of Africa for making an excellent kind of soup,

The O. P. has been introduced into some parts of America, and is now abundant in them.

**OIL-REFINING.** Several oils, from the mode of their extraction, are necessarily impure, and various means are taken for refining or purifying them: thus, the so-called *fish-oils*—that is, whale, seal, cod, &c.—are clarified either by mixing them with a chemical solution, or by passing steam through them and filtering through coarse charcoal. The chemical solutions employed are various. One method is to use a strong solution of oak bark, the tannic acid in which combines with the albuminous matters present in the oil, and precipitates them; another plan is, to agitate bleaching-powder, formed into a milk with water, with the oil; and then, after subsidence of the chloride of lime and water, to wash the oil with water, or jets of steam passed through it. A more simple and very effective plan, invented by Mr Druu, is to apply a steam heat not exceeding 200° F., and then pass a current of air of the same temperature through it continuously for some time: this effectually bleaches the oil.

Olive, and some other vegetable oils, are refined by agitating them with a saturated solution of caustic soda. This renders the whole soapy; but after a time the oil precipitates a saponaceous deposit, and the remainder becomes quite clear and pure, and is then poured off. The value of several of the most important oils of commerce is so greatly increased by refining, that this art has now become a very important branch of business, and is carried out on a large scale.

**OILS (including Fats).** The fats and fixed oils constitute an important and well-marked group of organic compounds, which exist abundantly both in the animal and vegetable kingdoms. They are not simple organic compounds, but each of them is a mixture of several such compounds to which the term *glycerides* is applied; and the glycerides which by their mixture in various proportions form the numerous fats and oils are mainly those of palmitic, stearic, and oleic acids—if we adopt the recent view that Margarinic Acid (q. v.) has no independent existence—and to a less extent those of other fatty acids, which will be presently noticed, such as butyric, caproic, caprylic, and capric acids, which are obtained from butter; myristic acid, which is obtained from cocoa-nut oil, &c. The members of this group may be solid and hard, like tallow; semi-solid and soft, like butter and lard; or fluid, like the oils. The solid and semi-solid are, however, generally placed together and termed fats. In contradistinction to the fluid oils. The most solid fats are readily fusible, and become reduced to a fluid or oily state at a temperature lower than that of the boiling-point of water. They are not volatile, or, in other words, they cannot be distilled without decomposition, and it is not until a temperature of between 500° and 600° is reached that they begin nearly simultaneously to boil and to undergo decomposition, giving off acroleine (an acrid product of the distillation of glycerine) and other compounds. In consequence of this property, these oils are termed *fixed oils*, in contradistinction to a perfectly separate group of oily matters, on which the odorous properties of plants depend, and which, from their being able to bear distillation without change, are known as *volatile oils*. These, which are also known as *essential* or *etheral oils*, differ in toto in their chemical composition from the compounds we are now considering, and will be separately noticed in the latter part of this article. All the fats and oils are lighter than water, and are perfectly insoluble in that fluid. Their specific gravity ranges from about 0.91 to 0.94. They dissolve in ether, oil of turpentine (one of the volatile oils), benzol, and to a certain extent in alcohol; while, on the other hand, they act as solvents for sulphur, phosphorus, &c. If a fatty matter be shaken with a watery solution of albumen, gum, or some other substance that increases the density of the water, and renders it viscid, the mixture assumes a milky appearance, in consequence of the suspension of the fat or oil in the form of microscopic globules, and is termed an *emulsion*. These bodies possess the property of penetrating paper and other fabrics, rendering them transparent, and producing what is well known as a greasy stain. They are not readily inflammable unless with the agency of a wick, when they burn with a bright flame. In a pure and fresh state they are devoid of taste and smell, but on exposure to the air they become oxidised and acid, assume a deeper color, evolve a disagreeable odor, and are acrid to the taste; or, in popular language, they become *rancid*. The rapidity with which this change occurs is considerably increased by

the presence of mucilaginous or albuminous bodies. The rancidity may be removed by shaking the oil in hot water in which a little hydrated magnesia is suspended.

The general diffusion of fats and oils in the animal kingdom has been already described. (See *FATS, ANIMAL*.) In the vegetable kingdom they are equally widely distributed, there being scarcely any tissue of any plant in which traces of them may not be detected; but they are specially abundant in the seeds. The seeds of the *cruciferae* are remarkably rich in oil; linseed yielding fully 20 per cent., and rapeseed about 40 per cent. of oil; and some fruits, as those of the olive and oil-palm, yield an abundance of oil.

The uses of the oils and fats are numerous, and highly important, various members of this group being extensively employed as articles of food, as medicines, as lubricating agents, in the preparation of soaps, plasters, ointments, varnishes, pigments, candles and other means of illumination, for the purpose of dressing leather, &c. The following are the most important members of the group:

1. *Vegetable Fats*.—The chief solid fats of vegetable origin are cocoa-nut oil, nutmeg butter, and palm oil. The fluid vegetable fats or oils are divisible into the *non-drying* and the *drying oils*; the latter being distinguished from the former by their becoming dry and solid when exposed in thin layers to the air, in consequence of oxygenation; while the former do not absorb oxygen, but are converted by hyponitric acid or sub-oxide of mercury into elaidine (as described in the article *OLEINE*), a reaction which is not exhibited by the drying oils. Some of the drying oils, especially linseed oil, when mixed with cotton, wool, or tow, absorb oxygen so rapidly, and consequently become so heated as to take fire, and many cases of the spontaneous combustion of heaps of oily materials that have been employed in cleaning machinery have been recorded. The drying property may be much increased by treating the oils with a little litharge or oxide of manganese, and linseed oil thus treated is then known as *boiled oil*. The chief non-drying oils are olive oil, almond oil, and colza oil; while the most important drying oils are those of linseed, hemp, poppy, and walnut; castor oil seems to form a link between these two classes of oils, since it gradually becomes hard by long exposure to the air.

2. *Animal Fats*.—The chief solid fats are suet, lard, butter, goose grease, &c.; while among the fluid fats or oils, sperm oil, ordinary whale oil, cod-liver oil, and neat's-foot oil may be especially mentioned. In many of their characters, spermaceti and bees-wax resemble the solid fats, but, as will be shewn in the articles on these subjects, they are not glycerides. As a general rule, stearine and palmitine, both of which have comparatively high fusing points (between 157° and 114°), preponderate in the solid fats; while oleine, which is fluid at 32°, is the chief constituent of the oils.

One or two of the most important of the decompositions of the fats must be noticed. When any of these bodies are heated with the hydrated alkalies, they undergo a change which has long been known as *Saponification*, or conversion into soap (q. v.), in which the fatty acid combines with the alkali to form a soap, while the sweet viscid liquid glycerine is simultaneously formed. The combination of a fatty acid with oxide of lead forms a *plaster*. For further details on these points, the reader is referred to the articles *SOAP* and *PLASTERS*.

The process of saponification affords a ready means of isolating the fatty acids, as the stearic or oleic acids may be at once separated from an alkaline stearate or oleate by the addition of hydrochloric or tartaric acid. When the fatty acids are, however, required on a large scale, as for the manufacture of the so-called stearine candles, which in reality consist mainly of stearic and palmitic acids, sulphuric acid and the oil or fat are made to act upon each other at a high temperature. See *CANDLE*. The fatty acids may also be procured in a very pure form by the injection of superheated steam at a temperature of between 500° and 600° into heated fat—a process which, according to Professor Miller, “from its simplicity and from the purity of the products which it yields, bids fair to supersede those previously employed in the preparation of the fatty acids for illuminating purposes.”

The only fatty acids which have been specially mentioned in this article are those which occur in natural glycerides, such as stearic, palmitic, and oleic acids. The term *fatty acid* has, however, in Chemistry a wide signification, and is applied to many acids homologous to stearic acid, but not occurring in any natural fats or oils. Thus stearic acid may be taken as the type of a group of acids (of which seventeen

are already known) represented by the general formula  $C_nH_{2n}O_2$ , commencing with formic acid ( $C_1H_2O_2$ ), including acetic, propionic, butyric, valeric (or valerianic), caproic, cænanthyllic, caprylic, pelargonic, capric, lauric, myristic, palmitic, stearic, arachidic, and cerotic acids, and terminating with melissic acid ( $C_{31}H_{62}O_2$ ). These are divided into the volatile and the true (or solid) fatty acids; the volatile acids being those from formic to capric acid, while the remainder, beginning with lauric acid, are the true fatty acids. The volatile fatty acids are fluid, and for the most part oily at ordinary temperatures, may be distilled without change, possess a pungent odor, and are acrid to the taste, and their solutions redden litmus paper strongly. The true fatty acids, on the other hand, are solid at ordinary temperatures, are devoid of taste and smell, cannot be distilled except in *vacuo*, without decomposition, and only exert a slight action on litmus. The volatile acids occur in the animal and vegetable kingdoms (formic acid, for example, in red ants, and valeric acid, in the root of valerian), and they are likewise produced by the oxidation and spontaneous decomposition of numerous animal and vegetable products. The entire series, up to capric acid, may be obtained by oxidising oleic acid with nitric acid. The true or solid acids only occur as constituents of animal and vegetable fats.

Professor Miller makes a second group of fatty acids, of which oleic acid is the type, and which have the general formula  $C_nH_{2n-2}O_2$ ; but as oleic acid is the only member of this group which is of any practical importance, it is sufficient to refer the reader to the special article on that acid.

A complete list of even the chief fats and fixed oils would take up far more space than we can command. In the article "Fixed Oils," in "The English Cyclopædia," the reader will find 64 of the most important of these substances mentioned, with in most cases a brief notice of the origin and properties of each. The British pharmacopœia contains hog's-lard, mutton suet, cod-liver oil, concrete oil (or butter) of nutmeg, and almond, castor, croton, linseed, and olive oils, besides the closely allied substances spermaceti and wax.

The Volatile or Essential Oils exist, in most instances, ready formed in plants, and are believed to constitute their odorous principles. They form an extremely numerous class, of which most of the members are fluid; a few (oil of sweetgum, for example) being solid at ordinary temperatures, but all of them are capable of being distilled without undergoing change. They resemble the fixed oils in their inflammability, in their solubility in the same fluids, and in their communicating a greasy stain to paper or any other fabric; but the stain in this case soon disappears, and they further differ in communicating a rough and harsh rather than an unctuous feeling to the skin. Their boiling points are in almost all cases far higher than that of water, but when heated with water, they pass off with the steam—a property on which one of the chief modes of obtaining them depends. See PERFUMERY. The oils have characteristic penetrating odors, which are seldom so pleasant as those of the plants from which they are obtained, and their taste is hot and irritating. They vary in their specific gravity, but most of them are lighter than water, and refract light strongly. Most of them are nearly colorless when fresh, but darken on exposure to light and air; but a few are green, and two or three of a blue color. By prolonged exposure they absorb oxygen, and become converted into resins.

By far the greater number of them are products of the vital activity of plants, in which most of them exist ready formed, being enclosed in minute cavities, which are often visible to the naked eye. Although diffused through almost every part of a plant, the oil is especially abundant in particular organs of certain families of plants. In the *Umbelliferae*, it is most abundant in the seeds; in the *Rosaceæ*, in the petals of the flowers; in the *Myrtaceæ* and *Labiatae*, in the leaves; in the *Aurantaceæ*, in the rind of the fruit. As in the case of the animal and vegetable fats and fixed oils, so most of the essential oils occurring in plants are mixtures of two or more distinct chemical compounds, one of which usually contains no oxygen, while the others are oxidised. Of these, the former, which is a pure hydrocarbon, is the more volatile, and acts as a solvent for the others. Most of these oils, when cooled, separate into a solid and a fluid portion, to which the terms *Stearopten* and *Elaeopten* have been applied.

In the comparatively few cases in which the oils are not formed naturally, they are produced by a species of fermentation, as in the case of Oil of Bitter Almonds and Oil of Mustard (q. v.), while others are the product of the dry distillation or of

the putrefaction of many vegetable bodies. Some of the natural oils, as those of cinnamon, spirea, and winter-green, have also been artificially produced.

The essential oils are much employed in the fabrication of Perfumery (q. v.), for the purpose of flavoring liqueurs, confectionary, &c., for various purposes in the arts (as in silvering mirrors), and in medicine. The special uses of the most important of these oils in medicine will be noticed subsequently.

The members of this group, which is an extremely numerous one (more than 140 essential oils being noticed in the article on that subject in "The English Cyclopædia"), admit of arrangement under four heads. 1. Pure Hydrocarbons; 2. Oxygenous Essential Oils; 3. Sulphurous Essential Oils; 4. Essential Oils obtained by Fermentation, Dry Distillation, &c.

1. The *Pure Hydrocarbons* are for the most part fluid, and have a lower specific gravity, a lower boiling point, and a higher refractive power than the oxygenous oils. They absorb oxygen, and are converted into oxygenous oils and resins. They may be separated from oxygenous oils, with which they are usually associated, by fractional distillation. They include oil of turpentine ( $C_{20}H_{16}$ ), and the oils of bergamot, birch, chamomile, caraway, cloves, elemi, hop, juniper, lemons, orange, parsley, savine, and valerian, most or all of which contain the same hydrocarbon as Oil of Turpentine (q. v.), and in addition to it an oxidised compound; oil of copaiva ( $C_{20}H_{34}$ ), attar of roses ( $C_{15}H_{18}$ ), &c.

2. The *Oxygenous Essential Oils* may be either fluid or solid, the latter being also termed *Camphors*. A stearopten separates from most of the fluid oils on cooling. They are more soluble in water and spirit of wine than the pure hydrocarbons. They may be divided into (1) those which are fluid at ordinary temperatures, such as those of aniseed, chamomile, cajuput, caraway, cinnamon, cloves, fennel, lavender, peppermint, rue, spirea, thyme, winter-green, &c. Those marked with a (\*) are associated with the pure hydrocarbons already described. (2) The camphors, such as ordinary camphor ( $C_{20}H_{16}O_2$ ), Borneo camphor ( $C_{20}H_{18}O_2$ ), &c.

3. The *Sulphurous Essential Oils* are chiefly obtained from the *Cruciferae*. They probably all contain the radical *allyl* ( $C_3H_5$ ). The oils of garlic and mustard (both of which have been described in special articles), and those of horse-radish, scurvy-grass and asafetida, are the best illustrative of this division.

4. Amongst the essential oils obtained by fermentation, dry distillation, &c., may be mentioned the oils of bitter almonds and of black mustard, the oils of milfoil, plantain, centaury, &c. (whose leaves have no smell until they have been moistened for some time with water, when a kind of fermentation is set up, and oil is yielded in abundance), Furfuramide (q. v.), &c.

The British pharmacopœia contains the essential oils of anise, cajuput, caraway, chamomile, cinnamon, cloves, copaiva, coriander, cubeb, dill, juniper, lavender, lemon, nutmeg, peppermint, pimento, rosemary, rue, savine, spearmint, and turpentine. Of these, the oils of anise, cajuput, caraway, chamomile, coriander, dill, peppermint, pimento, and spearmint are used as stimulants and antispasmodics in cases of flatulence, griping, &c.; and to disguise the nauseous taste of various medicines. The oils of cajuput, cinnamon, and rue act similarly but more powerfully. The oils of copaiva and cubeb act in the same manner as the substances from which they are derived; oil of juniper is a powerful diuretic, and oil of savine (and to a less extent oil of rue) an emmenagogue. The oils of lavender and lemon are used to conceal the smell of sulphur ointment, and to give an agreeable odor to lotions, &c. The oil of rosemary is chiefly employed as a stimulating liniment, especially in cases of baldness; and the oil of nutmeg is seldom given medicinally except in the form of aromatic spirit of ammonia, into the composition of which it enters.

A very admirable paper on the essential oils, was read by Dr Gladstone before the Chemical Society, in the month of December 1863; and the reader who is anxious to pursue the subject further will find it advantageous to refer to this excellent production.

Bland oils—such, for example, as olive oil—were much used by the ancients as external applications in various forms of disease. Celsus repeatedly speaks of the use of oil applied externally with friction in fevers, and in various other diseases. Pliny says that olive oil warms the body and at the same time cools the head, and that it was used with these objects previously to taking cold baths. Aretæus recommends a sitz-bath of oil in cases of renal calculi, and Josephus relates that a similar mode of treatment was employed in the case of Herod. Galen prescribed "oil and

wine" for wounds in the head; and the parable of the good Samaritan affords additional evidence that this was a common mode of treating wounds. The use of oil preparatory to athletic exercises is referred to by numerous Greek and Latin writers.

As a cosmetic—that is to say, as a means of giving to the skin and hair a smooth and graceful appearance—its use has been prevalent in hot climates from the earliest times. There is abundant historical evidence of this usage of oil amongst the Egyptians, the Jews, the Greeks, and the Romans; and Pliny's statement that butter is used by the negroes, and the lower class of Arabs, for the purpose of anointing, is confirmed by the observation of all recent African travellers. In hot climates, there is doubtless a practical as well as an æsthetic object in anointing. The oil, being a bad conductor of heat, affords a certain amount of protection against the direct action of the solar heat; it is likewise serviceable as a protection against the attacks of insects, and as a means of checking excessive perspiration. The fact of oily and fatty matters being bad conductors of heat, serves also to explain why the Esquimaux and other dwellers in Arctic regions have recourse to the inunction of the blubber, &c. In their case the oily investment serves to prevent the escape of the bodily heat.

The Greeks and Romans not only employed oil for the purposes already mentioned, but in their funeral rites; the bodies of their dead being anointed with oil, with the view probably of postponing incipient decomposition. A similar practice existed amongst the Jews, and in the Gospels we find various passages in which our Lord referred to his own body being anointed by anticipation. It appears from the evidence of S. Chrysostom, and other writers, that this ancient usage of anointing the bodies of the dead was long retained in the Christian Church. See UNCTION; EXTREME UNCTION.

In conclusion, we may remark that the ancient system of anointing, as a means of medical treatment, has to a certain extent been revived in modern times. Many physicians of the present day combine the inunction of cod-liver oil with its internal administration, a combination first recommended by Professor Simpson of Edinburgh; and Sir Henry Holland advocates the practice of anointing the harsh, dry skin of dyspeptic patients with warm oils. There can, we think, be little doubt that there are many forms of disease in which the local application of medicinal oils would prove advantageous; but the great drawback to their use is, that the time required for properly rubbing them into the skin is more than most patients are willing to concede. For much curious information on the subject of this article, the reader is referred to a very interesting paper by Mr Hunter, "On the External Application of Oils," in the second volume of "The Edinburgh Medical and Surgical Journal."

**OILS IN THEIR COMMERCIAL RELATIONS.**—The solid animal oils found in commerce are butter and lard, tallow, mares' grease, goose grease, neatfoot oil, and unrefined yolk of egg oils. The two first are fully described under their names. See BUTTER, LARD. Tallow is the fat of oxen and sheep, but more especially the fat which envelopes the kidneys and other parts of the viscera, rendered down or melted. The qualities of this solid oil render it particularly well adapted for making candles, and until the end of the first quarter of the present century, candles for ordinary use were almost wholly made of it, the high price of wax and spermaceti preventing their employment except by the most wealthy and for ecclesiastical purposes. Besides its use in making candles, tallow is most extensively used in the manufacture of soap, and for the purpose of preserving machinery from rust. The trade in tallow with Russia, which produces the best, and with North and South America, and even with India and other countries, is very considerable; but it is declining, owing of course to the extension of gas and the enormous development of the Paraffin and Petroleum Oils (q. v.), and other light-giving materials. The quantities of tallow and stearine imported in five recent years into Britain were as follows:

	Tons.	Value £
1871.....	1,247,044	2,994,268
1872.....	1,252,144	2,792,570
1873.....	1,697,831	3,847,371
1874.....	1,165,948	4,173,118
1875.....	967,896	4,338,166

The chief use of tallow in this country is now in the manufacture of Soap (q. v.), and even in this it has yielded in importance to palm and cocoa-nut oils.

Mares' Grease is not nearly so solid as tallow. It is a yellowish-brown grease, imported extensively from Monte Video and Buenos Ayres, where vast numbers of horses are slaughtered for their hides, bones, and grease; it is particularly valuable as a lubricant for machinery, and is frequently employed for that purpose after much of its stearine has been removed for candle-making. The reason this material is called *mares' grease*, is said to be from the circumstance, that in South America horses are chiefly used alive, and mares are slaughtered as comparatively useless. Goose Grease is another soft fat, much valued by housewives for many purposes, but excepting that it is sold in some districts as a remedial agent, it has no commercial importance. Neats-foot Oil is a soft fat procured in the preparation of the feet and intestines of oxen for food as sold in the tripe-shops. The quantity obtained is not very great, but it is in much request by curriers for dressing leather. Yolk of Egg Oil is a hard oil, which, though little known in Britain, is extensively used in other countries where eggs are cheaper. In Russia, for instance, it is manufactured on so large a scale as to supply some of the largest makers of fancy soaps, and it forms the principal material in the celebrated Kazan Soap; and certain pomades are made of it which have a great reputation, and realise very high prices. The oil is not unlike palm oil in color and consistency; but when refined is liquid, and has a reddish-yellow color. Its price at Moscow is as high as 8s. per pound.

The liquid animal oils are more numerous, and, excepting tallow, are far more important, the so-called fish-oils being the principal. These are whale, porpoise, seal, cod, herring, shark, &c. The whales which are pursued for their oil are: (1.) The Sperm Whale. This huge creature is from 60 to 70 feet in length, and yields generally from 5000 to 6000 gallons of oil. The finest oil is taken from the great reservoir on the head. The oil of this species is all of a quality superior to others, and is known as sperm oil. For the method of procuring this oil, see CACHOLOT. (2.) The Right Whale, which yields by far the largest proportion of whale oil. This, with that yielded by other less important species, is usually called train oil. The term *train* is supposed to be a corruption of *drain*, and applies to the circumstance of the oil being drained out of the blubber; and in this sense it is also applied to sperm oil from the blubber of the cacholot, in contradistinction to the finer oil from the head matter. The Right Whale forms the chief object of the northern fisheries, but other species of *Balaenæ* are pursued in different parts of the world for the sake of their oil. See WHALES.

Amongst the smaller Cetæceans, the porpoises—called also dolphins ("puffydunders" on the east coast of Scotland)—and grampuses yield an excellent oil, second only in value to that of regular oil whales; and to obtain it, large numbers are occasionally killed in the British seas. The price of sperm oil ranges from £50 to £95 per tun, and that of ordinary train oil from £40 to 45 per tun of 252 gallons. The imports and consumption of the various kinds of whale oil for the five years 1871—1875 were as follows:

	Tuns.	Value	£
1871.....	24,679	"	1,087,734
1872.....	18,719	"	865,590
1873.....	17,886	"	766,927
1874.....	17,051	"	751,859
1875.....	19,359	"	917,701

A large quantity of very valuable oil is obtained from Seals, and the seal-fishery, as a means of obtaining oil, is only second in importance to that of the whale. It is carried on chiefly on the shores of Newfoundland, Greenland, and Labrador. Like the whales, the seals have a thick layer of blubber, in which the oil is contained. See SEAL. The first draining from the blubber is of a fine clear pale-straw color; the next, yellow or tinged; and the last is brown or dark. The price ranges in our markets at about £35 to £40 per tun for pale, £30 to £35 for yellow, and £25 to £30 for brown. The whale and the seal oils are nearly all used for burning in lamps, and for this purpose they are admirably adapted by their great illuminating power. They are also the best lubricants for machinery.

Of the true fish oils, that from the cod is most in importance, more especially since its medicinal properties were discovered. It is made only from the liver of the



fish; and the attempt which was made to induce a popular belief that the so-called cod-liver oil was different from the ordinary cod oil of commerce, was simply a cheat; no difference exists, and the oil is obtained just as good from the oil merchant, at a moderate price per gallon, as from the empiric at an exorbitant price per pint. Indeed, the purer the oil can be got, the better it is in a remedial point of view, notwithstanding the efforts made to convince the public that a certain color is better than any other.

Instead of the old and somewhat rude methods of preparing the oil (see COD-LIVER OIL), much more complete and efficient arrangements are now adopted. The livers, when taken from the fish are all examined, washed in clean water and placed in sieves to dry. Thence they are transferred to pans heated with steam, and after being exposed to a gentle heat for about three-quarters of an hour, the heat is discontinued; and when cold, the oil which has separated is skimmed off, and strained through flannel bags into tubs. Here certain impurities subside, and the clear oil is poured off from the dregs, and the contents of numerous tubs are transferred to galvanised iron cisterns in which a further settlement takes place. The oil is now ready for the filters, which are made of the strong cloth called mole-klin, through which it is forced by atmospheric pressure into the store-tanks, which are also of galvanised iron. Hence it is pumped into the casks for export, which are usually hogheads, tierces, and barrels. The value of cod-liver oil is about £34 to £40 per tun. The imports vary much according to the success of the fishery; they have reached nearly 1000 tons per annum. Besides its consumption in lamps and for medicinal purposes, cod oil is used in making some kinds of soap. Oil is occasionally made from the herring, but not in very great quantities; it, however, forms a commercial article. It is made from the whole of the fish, the smell of which it retains to a very disagreeable extent.

The lightest of all the fixed oils is made from the liver of the common shark; it ranges from specific gravity 0.865 to 0.867. This, and the oil made from the livers of the Common Skate (*Raja batia*), the Thornback (*R. clavata*), and the White Skate (*Rhinobatus cernicuulus*), are often substituted for the cod-liver oil used medicinally, but have not its valuable properties.

Under the name of lard oil, large quantities of the oleine of lard have been imported of late years from America. It is a secondary product, arising from the great manufacture of lard stearine for candle-making which has arisen in that country. Lard oil is worth about £45 to £53 per tun, and is principally used as a lubricant for machinery.

The solid vegetable fixed oils which find a place in commerce are palm oil, cocoanut oil, kokum or vegetable tallow, and carapa or carap oil. The palm oil is an oil of a bright orange-yellow color and an agreeable violet odor: it is obtained from the not very thick covering of the hard seeds of the Oil-palm (q. v.). The fruits, when gathered, are shaken out of the clusters, and are laid in heaps in the sun for a short time, after which the natives boil them slowly in water, when the oil separates and is skimmed off the surface, and carried in small quantities to the depôts of the traders, who transfer it to casks which are prepared to receive it on board the ships. The quantity thus collected is enormous. The imports into Britain alone for the five years 1871-1875 were as follows, in tons weight: (1871) 52,394; (1872) 54,335; (1873) 50,897; (1874) 53,353; (1875) 45,228. Previous to 1840, the chief use of palm oil was in making soap, but it was about that time found that the palmitine or fat acid of this oil was admirably adapted for the manufacture of Candles (q. v.); and since then it has become of much greater importance.

Cocoa-nut Oil is a white fat, with the peculiar smell of the kernel; it is made by grinding or pounding the kernel of the cocoa nut. After it has been boiled in water for a short time, the paste is submitted to great pressure, and a large quantity of milky juice is obtained; this is slowly boiled, and the oil separates and rises to the surface in considerable quantity, and is skimmed off. Twenty ordinary-sized nuts will yield as much as two quarts of oil. This oil is now very largely imported, and, treated in the same way as palm oil, forms a stearine, which greatly improves that of palm oil when mixed with it in proper proportions; neither does so well separately, and the consumption of cocoa-nut oil has consequently very greatly increased. Most of it comes from Ceylon, where the tree is largely cultivated on purpose. The imports in 1870 were 9930 tons; in 1872, 21,469 tons; and in 1875, 10,957 tons. By

far the greater proportion of this vast quantity is used by the candle manufacturers, and the remainder in making common soap, its disagreeable smell preventing its being employed for the better kinds.

Vegetable Tallow, or Kokum Oil, is also used by the candle-makers; only small quantities, however, are imported. It comes from Singapore, and is produced from the seed of *Garcinia purpurea*, a species of the same genus with the mangosteen. Another kind of vegetable tallow is made in China, from the seeds of *Stillingia sebifera*.

Carapa, Carap, Crab, or Andiroba Oil, is very extensively made in British Guiana and the West Indies, but it is nearly all used there, either as a pomade for preserving the hair, or as an agent for rheumatism and neuralgic pains, for which purposes, it is said to be very useful. See CARAPA.

The Bassia Oil is beginning to attract attention, and several importations have taken place from India, and some rather large quantities have reached Liverpool from Bombay, under the name of Muohwa Oil. This oil is of a soft butter-like consistency, and yellowish-green color, and is well adapted for soap-making and for machinery grease. See BASSIA.

The liquid vegetable oils are very numerous, and several are of great commercial importance. First in rank is Olive Oil, made from the ripe fruit of the Common Olive (*Olea Europea*). When good and fresh, it is of a pale greenish-yellow color, with scarcely any smell or taste, except a sweetish nutty flavor, much esteemed by those who use it. The finest qualities are the Provence Oil (rarely seen in Britain), Florence Oil, and Lucca Oil. These are all used for salads and for cooking. The Genoa is used on the continent for the same purposes; and Gallipoli, which is inferior, constitutes the great bulk of what is received in this country for cloth dressing, Turkey-red dyeing, and other purposes; the continental soap-makers also employ it extensively. The high price of the best qualities leads to much adulteration with poppy and other oils, but it is generally pretty safe when in the original flasks as imported. The mode of obtaining the finest kinds is by gentle pressure of the fruit. The cake is afterwards treated with hot water, from the surface of which an inferior quality is skimmed. The Gallipoli oil is obtained by allowing the olives to ferment in heaps, and then to press them in powerful oil-presses; the cake or *marc* is then treated with water once or twice, until all the oil is removed; this inferior oil is darker in color, being a yellowish or brownish green. We receive the finest from Italy, and the commoner qualities from the Levant, Mogador, Spain, Portugal, and Sicily. The present values range from £44 to £54 for common kinds, and the finest Lucca is £1 the half cask, or nearly £86 per tun measure. The total quantity imported during the four years 1872-1875 was as follows: (1872) 23,964 tons; (1873) 35,121 tons; (1874) 22,720 tons; (1875) 35,458 tons.

Nearly all the other liquid vegetable oils of this class are obtained from seeds, and as they are most of them treated in the same way, one description will suffice. First, the seeds are ground—and this in Britain is always done by vertical stones—into a kind of coarse meal, which is first warmed in pans, and then put in certain portions in woollen cloths or bags, so arranged as to be of uniform thickness; these are again wrapped in horse-hair cloths, and each parcel is placed between two flat boards slightly fluted off their inner sides, and then placed in the wedge-press. In this are two flannel bags filled with the meal and enclosed in horse-hair bags, each flattened between the flat boards. They are set upright, between the pressing-plates, one at each end of the press-frame, which is made of great strength, and often of cast iron. Next is placed the wedge; the other wedge is then suspended by a cord; the main wedge is lastly inserted, and the press is ready for action. The operation is very simple; a heavy wooden stamper, from 500 to 600 pounds-weight, is raised by machinery about two feet, and allowed to fall upon the wedge. This tightens all the other wedges and pressing-plates, and exerts a pressure of about 60 tons on each bag when fully driven home. The pressing-plates are pierced with holes; and through these holes the oil trickles and passes away by the pipe.

One of the chief seed oils is that of linseed (q. v.). Very little linseed oil is imported into Britain; the improved machinery, and the great demand for the oil-cake (see OIL-CAKE), cause it to be manufactured at home, and at present it is exported in considerable quantities; thus, from Hull alone there was exported in 1875, of seed-oil, expressed chiefly from foreign seed, no less than 6,846,725 gallons, and over

10,000 tons of oil-cake; and from London and Liverpool together about the same quantity. The total production of Great Britain for 1868 was estimated at 65,000 tons; for 1869, 61,000 tons; for 1871, 69,000 tons; and for 1872, 67,000 tons. In 1875, 15,628,316 gallons of seed-oil were exported. It is worth about £26 per ton. Rape or Colza Oil is a name which covers the product of several cruciferous seeds, as rape, turnip and other species of *Brassica*, radish, *Sinapis toria*, Gold of Pleasure, &c. The oil is clear brown and usually sweet, but with a mustard-like flavor; its illuminating powers are excellent, and it is also well adapted for wool-dressing. Very large quantities are made in Great Britain, chiefly from *Sinapis toria* and other Indian mustard seeds, which are imported under the name of Sarzee Seed. The imports of these seeds are occasionally as much as 60,000 quarters per annum. Hemp Seed yields a green oil which is much used in making soft soap, especially in Holland. In Russia it is eaten with various kinds of food, and is greatly liked by all classes.

The following are the names of a number of oils which are more or less used in this country: Cotton-seed Oil. Palm-nut Oil, a clear limpid oil from the hard nut of the oil-palm; this nut was formerly rejected as useless after the oil had been obtained from the fruit. Safflower-seed Oil, from the seeds of *Carthamus tinctorius*; it constitutes the real Macassar Oil. Sunflower-seed Oil, from seed imported from the Black Sea provinces of Russia; a rapidly increasing trade is springing up in this excellent oil. Poppy-seed Oil, from the seed of *Papaver conuiferum*, largely imported from India; it is as sweet as olive oil, and is extensively substituted for it, especially in France, where it is also very largely cultivated. Gingell-seed Oil, from the seed of *Sesamum orientale*, an important Indian staple of which we are large consumers; the oil is much used for wool dressing, &c. Ground-nut Oil, from the seeds of *Arachis hypogæa*, imported from Western Africa and India; this oil is particularly adapted for fine machinery, as it is not affected by cold. Niger, Til, or Teel-seed Oil, from the seeds of *Guizotia oleifera*, much imported from Bombay. Croton Oil, from the seeds of *Jatropha curcas*, largely used in wool dressing. The Croton Oil used in medicine is from *Croton tiglium*, of which only small quantities are imported; whereas of the other 1200 or 1400 tons, besides a quantity of the seed, often reach us in one year. Another highly valuable medicinal oil, Castor Oil (q. v.), is of great commercial importance. Almond Oil, chiefly used for perfumery purposes, is made from the kernels of the sweet and bitter almond; it is the most free from flavor and odor of any oil in use, notwithstanding that the essential oil of bitter almonds is so strongly flavored.

Oils made from the seeds of the following plants have some commercial value in other countries: *Madia sativa*; *Argemone Mexicana*; various species of Goanits; Garden Cress (*Lepidium sativum*); tobacco, now extensively used in Southern Russia, Turkey, and Austria; hazel-nuts; walnuts; nuts of stone pine; pistachio nut; tea-seed; this in China is a common painter's oil; the grape, from the seeds or stones, as they are called, saved from the wine-presses, used in Italy; Brazil-nuts (*Bertholletia excelsa*); *Calophyllum inophyllum*, called Pinnacottay Oil in India; *Melia azadirachta*, called in India by the names Neem and Margosa Oil; *Aleurites triloba*, called in India, Country Almond Oil, and much used for burning in lamps and torches; *Psoralea corylifolia*, called Baw-choe-seed Oil. The seed is sometimes imported to this country for pressing. Ben-seeds (*Moringa Pterygosperma*); Boon-nuts, the seeds of *Guilandina bonduc* and *G. bonducella*.

The following oils, new to European commerce, were shown in the International Exhibition of 1862. India.—Teorah Oil, from the seeds of *Brassica cruciatastrum*; Capala Oil, from the seeds of *Rottlera tinctoria*; Cardamom Oil, from the seeds of *Elettaria Cardamomum*; Hidgee Badham Oil, from the seeds of *Anacardium occidentale*, or Cashew-nut, now largely cultivated in India; Cassia-seed Oil; Chammoogra Oil, from the seeds of *Hydnocarpus odorata*; Cheerungee Oil, from the seeds of *Buchanania latifolia*; Cheminarum Oil, from the seeds of *Amoora raditida*; Circassian-bean Oil, from the seeds of *Adenanthera pavonina*; Hoorboory Oil, from the seeds of *Polanisia icosandra*; Custard Apple-seed Oil, from the seeds of *Anona squamosa*; Exile Oil, from the seeds of *Cerbera Thevetia*; Monela-grain Oil, from the seeds of *Dolichos uniflorus*; Kanari Oil, from the seeds of *Canarium commune*; Khaliziri Oil, from the seeds of *Vernonia Anthelmintica*; Malkungraes Oil, from the seeds of *Celastrus paniculatus*; Bakul Oil, from the seeds of *Nim-*

*sops elengi*; Rana Oil, from the seeds of *Mimusops Kaki*; Moodooga or Pulas Oil, from the seeds of *Butea frondosa*; Nāhor or Nageshur Oil, from the seeds of *Mesua feraz*; Hone-seed Oil, from seeds of *Calophyllum calaba*; Poonga, Caron, or Kurr-mig Oil, from the seeds of *Pongamia glabra*; Vappauley Oil, from seeds of *Wrightia antidysenterica*; Babool Oil, from seeds of *Acacia Arabica*; Gamboge Oil, from seeds of the Gamboge-tree (*Garcinia pictoria*); Coodlri Oil, from the seeds of *Sterculia fatida*; Kikuel Oil, from the seed of *Salvadora persica*; Marotty, Surrate, or Neeradimootoo Oil, from the seeds of *Hydnocarpus inebrians*; and Fundi-kai Oil, from the nutmegs of *Myristica malabarica*.

*From Brazil.*—Oils from the seeds of *Peuceletia cardifolia*, *F. monosperma*, *Anisoperma*, *passiflora*, *Cucurbita*, *citrullus*, *Mabea*, *fistuligera*, *Anda gomesii*, *Myristica bicukiba*, *Carpotroche*, *Brasilensis*, *Dipterix odorata*, *Theobroma cacao*, *Acrocomia solero carpa*, *Nectandra cymbarum*, and from the fat of the Alligator and the Tapir, all for medicinal and perfumery purposes; and oils from the seeds of *Obocarpus Bacaba*, *Os. palaua*, *Caryoca Brasilensis*, and *Euterpe edulis*, used for culinary and lighting purposes.

*From British Guiana.*—Oil drawn from the stem of *Oreodaphne optifera*; it resembles refined turpentine, and is suggested as a solvent for india-rubber. Wallaba Oil, from the wood of the Wallaba-tree (*Eperera falcata*), medicinal.

The preparation of the essential oils is treated of under PERFUMERY.

The importance of the manufacture of oils is very great; in 1875 the value of the imports of the leading staples of this trade—viz., fish, palm, cocoa, and olive oils—was no less than £4,012,901. The aggregate of the other kinds was £2,471,590. In addition, oil seeds to the value of over £6,500,000 are imported for crushing in Great Britain; whilst the exports of oil amount in value to about £1,600,000. Thus, it will be seen that this trade represents a capital of above £14,000,000 sterling.

**OIL-WELLS AND OIL TRADE.** One of the most remarkable trades, suddenly sprung up into importance in modern times, is that in oil obtained from subterranean sources. See NAPHTHA.

It is now known that oil-bearing mineral beds exist in various parts of America, as well as in the older continent; but the richest deposit hitherto discovered is in the United States, in Venango county, at a spot in Pennsylvania not far from the point of junction of that state and New York state with Lake Erie. Oil had for many years been seen floating on the surface of the water of a well near Titusville; it was taken up by absorption by means of flannel, and applied to medicinal purposes. Dr Brewer, in 1853, suggested that it might possibly be used for lubricating and for illumination; and in the following year was formed the Pennsylvania Rock-oil Company. This Company languished until 1855, when Colonel Drake, manager of the Company, and Mr Bowditch, resolved to sink a well purposely for oil. They were amply rewarded, for oil was pumped up at a rate varying from 400 to 1000 gallons daily. The news being spread abroad, adventurers quickly came to the district, which obtained the names of Oil Creek and Petrolia; and they experienced every degree of fortune from utter failure to splendid success, according to the spot at which they happened to sink their wells. So rapidly did the works proceed, that by 1860, it was known that oil existed beneath 100 square miles of country, at a depth varying from 70 to 500 feet. In 1861, the first large flowing well was struck—that is, a well up which the oil rose so profusely as to flow over the surface, yielding 1000 barrels (of 40 gallons each) per day; and another that yielded 2500 barrels. This new good fortune increased the excitement and the well-digging.

The uncertainty in this trade is something extraordinary. On one occasion, a well was bored with the usual centrebit to a considerable depth without any oil being found. On withdrawing the bit, and putting in the rimmer or rimmer to widen the hole, a vein was struck at the side. The bit had just missed the vein, and the well would have been a failure had not the orifice been enlarged. This incident gives meaning to a phrase much used in America—that of “striking oil.” On another occasion, a well was bored which promised to be very productive, a large amount of oil flowing; the owner of the well not being ready to collect it, a plug was driven into the pipe; but upon the removal of this plug, when tanks had been built, the oil had altogether disappeared. The deepest well sunk in the district, more than 1000 feet, yielded no oil whatever; and altogether only 15 per cent. of the borings were successful. Very often, there was twice as much water as oil in the liquid

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pumped up; and in some instances, the mixed oil and water was suddenly succeeded by water alone, thereby putting a stop to any further profitable operations.

When the oil began to be sent in large quantity to New York and other towns, the cheapness of price led to its application as lamp-oil, as fuel to be converted into gas, and in many other ways: this led to a constantly increasing demand; the demand brought the price up again to a reasonable figure at Petrolia; and the price induced the sinking of new wells. Considering that the produce of the district reached 20,000,000 gallons in 1861, it can be easily understood that commercial arrangements multiplied rapidly. Small villages rose into large towns, with banks, hotels, and wealthy people, all, however, begrimed with oil. Titusville, which had 243 inhabitants in 1855, rose to nearly 10,000 in 1866. Another place, called Oil City, has its two newspapers devoted mainly to oil-news, and transacted business to the amount of £3,000,000 per annum. By the end of 1866, it was estimated that there had been 90,000,000 dollars invested altogether in this and other parts of the United States; and that the average price at the well's mouth had settled down at about 10 dollars per barrel, or a shilling a gallon.

In July, 1860, oil was discovered in the state of Ohio, and within six months 30 wells were sunk there. At Sandy Valley in Kentucky, Perry County in Indiana, Gardiner in Illinois, Yates County in New York, and Chattanooga in Tennessee, the oil-wells have attracted some attention. The Canadian deposit is a remarkable one. Near a village, now a large town, called Oil Springs, in Inneskilling county, at the southern end of Lake Huron, a busy community has sprung up. In 1861, while sinking a well at this spot, in a forest where much semi-solid tar-like matter had often been found, the men were surprised by a sudden upburst of oil. This discovery set enterprising adventurers to work; and by the year 1863 there had been more than 900 wells sunk, within an area of only two miles by one. At first the oil flowed from most of these wells; but the level gradually sank, and the oil could only be obtained by pumping. At the end of the six years, one-half of the wells had ceased altogether to flow; and the wells since dug have been still more unceremonious in their yield. The oil appears to lie in fissures in the limestone; but the well-borers have not yet succeeded in finding symptoms whether a particular spot will yield profitably or not at all. One particular well gave 35,000 barrels in 10 months, and by that time had exhausted itself. The recognised rental became, 700 dollars down per acre, and one-third of the oil. The oil requires refining, to remove the tar, the volatile constituents, and the offensive odor. The Canada oil appears to be more disagreeable than that of the United States, and to be less in favor in consequence. The average produce per well in Pennsylvania and Canada cannot be stated, on account of the extreme fluctuations. In 1861, there was an estimate that 100 wells in Petrolia yielded 15 barrels per day each. The total American—that is, Canada and the U. States—product in 1863 was 3,695,000; in 1869, 4,717,000; and in 1870, 6,525,000 bbls.; and in 12 years, from 1859 to 1870, 34,388,100 bbls. of crude petroleum. The price at New York has ranged between the very wide limits of 9 to 55 cents per gallon for crude oil, and 19 to 120 cents for refined. The oil was first imported into Great Britain in 1861, since which year the import has steadily and greatly increased, amounting in 1875 to 77,661 tons, value £781,282.

In 1865, a shale was discovered in New South Wales, similar to the Boghead coal or Torbanehill mineral of Scotland, but richer in oil, and more free from sulphur. When distilled at Sydney, from 100 to 160 gallons of oil were obtained from one ton of shale. The seam in Hartley district is  $5\frac{1}{2}$  feet thick. Efficient distilling apparatus has been sent out from England; and the shale is either distilled for oil or for gas, according to circumstances. See NAPHTHA and SHALE.

OIRIR-GAEL, a name which, in the early times of Scottish history, was applied to the Gaels of the coasts, in contradistinction from the Gall-Gael or Islesmen. There was long a struggle for superiority between these two races, represented respectively by Somerled of the Isles and the later kings of Man, in which the latter were eventually successful, uniting under one head the dominion of Argyle and the Isles.

OISE, a river of France, one of the chief affluents of the Seine, rises in the vicinity of Roeroy, in the north of the department of Ardennes, and flows south-west, joining the Seine at Conflans-Sainte-Honorine, after a course of 150 miles, for the

last 75 of which it is navigable. The fall of the river is very gradual, and its course is extremely sinuous. It is connected by canals with the Somme, the Sambre, and the Scheldt, and forms one of the chief commercial routes between Belgium and Paris. It becomes navigable at Chaunay.

OISE, a department in the north of France, is bounded on the e. by the department of Aisne, and on the w. chiefly by that of Seine-Inférieure, which intervenes between it and the English Channel. Area, 1,445,809 English acres, of which 950,000 acres are in arable land; pop. (1872) 396,804. The principal rivers are the Oise—from which the department derives its name—and its tributaries the Aisne and Therain. The department is almost wholly included in the basin of the Oise; and as the course of that river indicates, the surface—consisting for the most part of extensive plains—has a general slope toward the south-west. The soil is in general fertile, and agriculture is well advanced. The products are the usual grain-crops, with an immense quantity of vegetables, which are sent to the markets of the metropolis. The department is divided into the four arrondissements of Beauvais, Clermont, Compiègne, Senlis; capital, Beauvais.

OITI (*Mogutia tomentosa*), a tree of the natural order *Chrysobalanaceæ*—by many botanists regarded as a suborder of *Rosaceæ* (q. v.)—a native of the north of Brazil, and valuable on account of its timber, which is very good for ship-building.

O'KA, an important commercial river of Central Russia, the principal affluent of the Volga from the south, rises in the government of Orel, and flows in a generally north-east direction, forming a common boundary between the governments of Tula, Kaluga, and Moscow; and afterwards flowing through the governments of Riazan, Vladimir, and Nijni-Novgorod. It joins the Volga at the city of Nijni-Novgorod, after a course of 837 miles. Its basin, estimated at 127,000 square miles in extent, comprises the richest and most fertile region of Russia. The principal towns on its banks are Orel, Beleff or Bielev, Kaluga, Riazan, and Murom; the most important affluents are the rivers Moscow, Kliasma, and Tzua. During spring, the Oka is navigable from Orel to the Volga; but in summer the navigation is obstructed by sandbanks. It communicates with the ports on the Baltic, Caspian, and White Seas; and the cargoes annually shipped down the river amount in value to several million pounds sterling.

O-KEE-CHO-BEE, a lake bordering on the Everglades of Southern Florida (see FLORIDA), about 120 miles in circuit, receiving several small rivers, and having for its outlet the river Caloo-sa-hatchee, which flows westerly into the Gulf of Mexico.

OKEN (originally Ockenfuss), Lorenz, a celebrated German naturalist, was born at Bohlsbach, in Würtemberg; August 1, 1779. He studied at Würzburg, and Göttingen; became extra-ordinary professor of medicine at Jena in 1807, where his lectures on natural philosophy, natural history, zoology, comparative anatomy, vegetable and animal physiology, attracted much notice. In 1812, he was appointed ordinary professor of natural science; and in 1816, commenced the publication of a journal partly scientific and partly political, called "Iris," which continued to appear till 1848. The opinions promulgated in the "Iris" led to government interference, and O. resigned his chair, and became a private tutor, devoting his leisure to the composition of works on natural history. In 1828, he obtained a professorship in the newly-established university of Munich; but in 1832, exchanged it for another at Zürich, where he died, 11th August 1851. O. aimed at constructing all knowledge *a priori*, and thus setting forth the system of nature in its universal relations. The two principal works in which this idea is developed are his "Lehrbuch der Naturphilosophie" (Jena, 1808—1811), and his "Lehrbuch der Naturgeschichte" (3 vols. Leip. 1818—1827). The former has been translated into English, and published by the Ray Society under the title of "Elements of Physio-philosophy." As O.'s philosophic system of nature was very peculiar, and quite unlike anything that had preceded it, O. invented a nomenclature of his own, which, however, in many cases is forced and pretentious, composed for the most part of new-coined words, and difficult to remember. It therefore found little favor, and O. was long regarded—particularly by French and English savans—as a

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mere dreamer and transcendental theorist; nor can it be denied that he is largely such, infected with the worst vices of the school of Schelling, to which he belonged; but some of his "Intuitions"—if we may so term his scientific suggestions—were remarkably felicitous, and in the hands of rigorous demonstrators, have led to great results. In his work "*Di Zeugung*" (*On Generation*, Hamb. 1806), he first suggested that all animals are built of vesicles or cells; in his "*Beitrag zur vergleichenden Zoologie, Anatomie und Physiologie*" (1806) he pointed out the origin of the intestines in the umbilical vesicle; and in the same year lighted accidentally upon the idea, since so prolific of results, that the bones of the skull are modified vertebrae. On account of this discovery, he has been termed "the father of morphological science." That O., and not G  the, was the original discoverer of the vertebral relations of the skull, has been conclusively shewn by Owen, in a valuable notice of O. in the "*Encyclopædia Britannica*."

**OKHO'TSK**, Sea of, an extensive inlet of the North Pacific Ocean, on the east coast of Russian Siberia. It is bounded on the n. by the wastes of Siberia, on the e. by the peninsula of Kamchatka, and is partially enclosed by the Kurile Islands on the s., and by the island of Saghalien on the w. It is 1000 miles in length, and 600 miles in breadth. The river Ud, which enters it on the north, is 400 miles in length. Owing to climate and position, the Sea of O. is unlikely ever to become the scene of much commerce. On its northern shore, at the mouth of the Okhota—from which it derives its name—is the small seaport of Okhotsk, lat. 57° 21' n., long. 145° 17' e. This town has only 236 inhabitants, and has been entirely superseded by the ports of Ayan and Nikolayevsk.

**OLAF**, the Saint, one of the most revered of the early Norwegian kings, was born in 905; and after having distinguished himself by his gallant exploits, and made his name a terror in several warlike expeditions on the coasts of Normandy and England, succeeded, in 1015, in wresting the throne of Norway from Eric and Sverdr Jarl. The cruel severity with which he endeavored to exterminate paganism by fire and sword, alienated the affection of his subjects, many of whom sought security from his persecution in the territories of Knut or Canute the Great, king of Denmark; and it was only through the powerful aid of his brother-in-law, the Swedish Anund Jacob, that his authority could be upheld. O.'s hot-headed zeal, however, after a time exhausted the patience of the people, who hastened to tender their allegiance to Knut, on his landing in Norway in 1028, when O. fled to the court of his brother-in-law, Jaroslav of Russia, who gave him a band of 4000 men, at the head of whom he returned, in 1030, and gave Knut battle at Stiklestad, where O. was defeated by the aid of his own subjects, and slain. The body of the king, which had been left on the field of battle, and buried on the spot by a peasant, having begun to work miracles, his remains were carefully removed to the cathedral of Trondhjem, where the fame of their miraculous power spread far and wide, attracting pilgrims from all parts of the Scandinavian peninsula. O. was solemnly proclaimed patron saint of Norway, in the succeeding century; and from that period to the Reformation, he continued to gather round him a rich heritage of mythical legends and popular sagas, the memory of which still lingers in the folk-lore of Norway. In 1047, the order of Olaf was created, in honor of the Saint, by King Oscar I. of Sweden and Norway.

**OLBERS**, Heinrich Wilhelm Mathias, a celebrated German physician and astronomer, was born at Arbergen, a small village of Bremen, October 11, 1758. He studied medicine at G  ttingen from 1777 till 1780, and subsequently commenced to practise at Bremen, where, both as a physician and as a man, he was highly esteemed by his fellow-citizens. In 1811, he was a successful competitor for the prize proposed by Napoleon for the best "*Memoir on the Croup*." O. wrote little on medical subjects, for, from 1779, all the leisure time which he could abstract from professional occupations was devoted to the enthusiastic study of astronomy. The first thing which brought him into notice, was his calculation of the orbit of the comet of 1779, which was performed by him while watching by the bedside of a sick patient, and was found to be very accurate. Comets were the chief objects of his investigation, and he seems to have been seized with an irresistible predilection for these vagabonds of the solar system, which his two important discoveries of the planets Pallas (1802) and Vesta (1807) could not diminish. In 1781, he had the honor of first re-discovering

the planet Uranus, which had previously been supposed, even by Herschel himself, to be a comet, and which had been sought for in vain. He also discovered five comets, in 1793, 1802, 1804, 1815, and 1821, all of which, with the exception of that of 1815 (hence called *Ober's comet*), had been some days previously observed at Paris. His observations, calculations, and notices of various comets, which are of inestimable value to astronomers, were published in the "*Annuaire de Bode*" (1782-1829), in the "*Annuaire of Encke*" (1833), and in three collections by the Baron de Zach. Most of these calculations were made after a new method, discovered by himself, for determining the orbit of a comet from three observations; a method which, for facility and accuracy, he considered as greatly preferable to those then in use. A detail of it appeared in a journal published at Weimar (1797), and a new edition by Encke in 1847. O. was one of that small band of astronomers which included also Schröter, Gauss, Pinzoli, Bode, Harding, &c., who in the first ten years of the 19th c. devoted their energies to the observation of those planets which were coming to light between Mars and Jupiter. As above stated, two of them, the second and fourth in order of discovery, were detected by O. himself; and the general equality of the elements of the four planeloids, led him to propound the well-known theory that these, and the other planeloids (q. v.) since discovered, are but fragments of some large planet which formerly revolved round the sun at a distance equal to the mean of the distances of the planeloids from the same luminary. It was this theory which led him, after the discovery of Pallas, to seek for more fragments of the supposed planet, a search resulting in the discovery of Vesta. O. also made some important researches on the probable lunar origin of meteoric stones, and invented a method for calculating the velocity of falling stars. O. died at Bremen, 2d March 1840; and in 1860, his fellow-citizens erected a marble statue in honor of him. O., as a writer, possessed great powers of thought, combined with equal clearness and elegance of expression. The dissertations with which he enriched the various branches of astronomy are scattered through various collections, journals, and other periodicals.

**OLD POINT COMFORT**, a village and watering-place in Virginia, U. S., at the entrance of Hampton Roads and James River, 12 miles from Norfolk, and the site of Fortress Monroe, the largest military work in the United States.

**OLD RED SANDSTONE**, the name given to a large series of Paleozoic rocks, of which red sandstones are the most conspicuous portions, but which contains also white, yellow, or green sandstones, as well as beds of clay and limestone. The group lies below the Carboniferous strata, and was called "Old" to distinguish it from a newer series of similar beds which occur above the Coal Measures. The discovery that the highly fossiliferous calcareous rocks of Devonshire and the continent occupied the same geological horizon, shewed that the name was very far from being descriptive of all the deposits of the period, and suggested to Murchison and Sedgwick the desirableness of giving them a new designation. They consequently proposed Devonian, which has been extensively adopted; but it is liable to the same objection as that urged against the name it was intended to supplant, inasmuch as it incorrectly limits geographically what the other limits lithologically. Many names used by geologists are similarly at fault; there is therefore no good reason why the old name should be given up, especially as it has been rendered classical by the labors and writings of Hugh Miller, the original monographer of these rocks.

The position of the O. R. S. series is easily determined, though the sequence of the various beds which form it is somewhat obscure. All the rocks are situated between the beds of the Silurian and Carboniferous periods. In Wales, Scotland, and Ireland it has been observed that there is an old series of red sandstones which are more or less conformable with the underlying Silurian and a newer series unconformable with the older strata, but conformable with the overlying Carboniferous rocks. The great interval represented by this break has been believed to be that during which the Calcareous Devonian rocks were deposited. The recent researches, however, of Mr Salter shew that the one set of beds do not alternate with the other, but that they are really contemporaneous—the coarse shallow water deposits of conglomerate and sandstone having been formed on the shores of that sea in whose depths the deposits of thicker mass, finer grain, and lighter color, full of marine shells and corals, were at the same time being aggregated.



The strata of the period have been arranged in four groups. 1. Upper Old Red Sandstone, including the Marwood and Petherwin groups. 2. Middle Old Red Sandstone, including the Dartmouth and Plymouth groups. 3. Lower Old Red Sandstone, including the North Foreland and Torbay groups. 4. Tilestones or Ledbury Shales.

1. The Upper Old Red Sandstones are conformable with the inferior strata of the Coal Measures, and differ so little petrologically, or even paleontologically from them, that they have been considered as the basement series of that period. They consist of yellowish and light-colored sandstones, which are at Dura Den, in Pifeshire, remarkably rich in some of their layers in the remains of *Holoptichius*, *Pterichius*, *Dendrodus*, &c. In the south of Ireland, and at Dunse, similar beds contain a freshwater shell very like the modern *Anodon*, and fragments of a fern called *Cyclopteris Hibernicus*. Mr. Salter has shewn, from the intercalation of the marine beds with the red sandstone, and from the identity of the fossils, that the Devonian representatives of these beds are the Marwood and Petherwin groups. These consist of dark-colored calcareous and argillaceous beds, and gray and reddish sandstones. The fossils found in them are shells and land-plants, many of them belonging to the same genera, but different species to those which are found in the Carboniferous system. The little crustacean *Cypridina* and *Clymenia* are so characteristic of this division, that in Germany the strata are known as the *Cypridinien Schiefer* and *Clymenien Kalk*.

2. The Middle Old Red Sandstone is represented in the north of Scotland by the *Calthness flags*, a series of dark-gray bituminous schists, slightly micaceous or calcareous, remarkably tough and durable. Throughout their whole thickness they are charged with fossil fish and obscure vegetable remains. The characteristic fishes belong to the genera *Coccosteus*, *Asterolepis*, and *Dipterus*. The corresponding beds in Devonshire are the Dartmouth and Plymouth groups, which consist of extensive deposits of limestones and schists, all of them abounding in the remains of corals, trilobites, and shells. In the German equivalent, the Eifel Limestone, but especially in the Russian, the characteristic invertebrate fossils of the Devonshire calcareous beds have been found associated with the remains of *Coccosteus*, shewing beyond doubt the identity of these various beds. The *Calceola* Schieffer of German geologists belongs to the Middle Old Red; it receives its name from the abundance in it of a singular brachiopod (*Calceola sandalina*).

3. The Lower Old Red Sandstone consists of strata of red shale and sandstone, with beds of impure arenaceous limestone (corstone), and frequently at the base great deposits of red conglomerate. The fossils peculiar to this division are the remarkable fish *Cephalaspis*, and the huge crustacea of the genus *Pterygotus*, besides a few shells. To the south of the Grauplans, the strata consist of a gray paving-stone and coarse roofing-slate. The Devonian representatives of this section are the sandstones and slates of the North Foreland, Linton, and Torbay, and the series of slaty beds and quartz ore sandstones developed on the banks of the Rhine near Coblenz. The *Cephalaspis*, so characteristic of the corstones, has been found in the Rhenish beds.

4. The Tilestones or Ledbury Shales consist of finely laminated reddish and green micaceous sandstones, which have been noticed underlying the Old Red only on its western borders in Herefordshire. The fossils of these beds shew a Silurian fauna with a number of Old Red forms; the Tilestones are consequently referred sometimes to the one period, and sometimes to the other.

The O. R. S. occupies a considerable portion of the surface of Great Britain. In the north, it forms the boundary lands of the Moray Firth; beginning even as far north as the Shetlands and Orkneys, it covers the whole of Calthness, and in more or less broken tracts the east of Sutherland, Ross, and Cromarty, and the north of Inverness, Nairn, and Elgin. In the great central valley of Scotland it is the setting in which the coal measures are placed, stretching across the country on the one margin from Forfar to Dumbarton, and occurring on the other in separated tracts in Lanark and Berwick. In the southern division of the island it is limited to a large triangular district in the south-west. The apex of the triangle is at Wenlock, in Shropshire; a line thence to Start Point, in Devon, would limit it on the east, and a second to Milford Haven would do so on the west. The Bristol Channel bisects it. A depression in the Welsh portion is occupied with South Wales coal-

field; and in a similar depression in Devon, the culm-beds are situated. In Ireland, strata of this age are found in the counties of Kilkenny, Waterford, Cork, and Kerry. The Devonian rocks have been carefully studied in Belgium and the Rhine district, and also in Russia, where they cover a larger district in the north of the empire. The American representatives of this period are extensively developed in New York, Pennsylvania, and Canada. The invertebrate animals found in the Old Red do not differ much from those of the Upper Silurian. Corals are remarkably abundant and beautiful in the Devonian limestones. Goniolites and Clymenia make their first appearance in this period, with several forms of lower mollusca. Trilobites are still numerous. But the most striking feature in the period is the abundance of fish of curious forms, strongly protected outside by hard bony cases, or by a dense armor of ganoid scales.

**OLDURY**, an important manufacturing town of England, in the county of Worcester, 29 miles north-north-east of the city of that name, on the river Tame. It contains numerous churches, meeting-houses, and schools. Owing to the extension of the iron-trade, O. has greatly increased in size and prosperity within recent years. There are coal and iron mines in the neighborhood; and in the town, iron, steel, locomotive engines, mills, edge-tools, draining-pipes, &c., are made and constructed. The Stour Valley Railway passes close by the town, and there is a station here. Pop. (1871) 16,410.

**OLDCASTLE**. Sir John, once popularly known as the "good Lord Cobham," whose claim to distinction is, that he was the first author and the first martyr among the English nobility, was born in the reign of Edward III.; the exact year is not known. He acquired the title of Lord Cobham by marriage, and signalled himself by the ardor of his attachment to the doctrines of Wickliffe. At that time, there was a party among the English nobles and gentry sincerely, and even strongly desirous of ecclesiastical reform—the leader of which was "old John of Gaunt—time-honored Lancaster." O. was active in the same cause, and took part in the presentation of a remonstrance to the English Commons on the subject of the corruptions of the church. At his own expense, he got the works of Wickliffe transcribed, and widely disseminated among the people, and paid a large body of preachers to propagate the views of the reformer throughout the country. During the reign of Henry IV., he commanded an English army in France, and forced the Duke of Orleans to raise the siege of Paris; but in the reign of Henry V. he was accused of heresy, and having, in a disputation with his sovereign, declared that "as sure as God's word is true, the pope is the great Antichrist foretold in Holy Writ," he was thrown into the Tower, whence, after some time, he escaped, and concealed himself in Wales. A bill of attainder was passed against him, and 1000 marks set upon his head. After four years' hiding, he was captured, brought to London, and—being reckoned a traitor as well as a heretic—he was hung up in chains alive upon a gallows, and fire being put under him, was burned to death, December 1417. O. wrote "Twelve Conclusions addressed to the Parliament of England," several monkish rhymes against "fl-shlye livers" among the clergy, religious discourses, &c.—See "Life of Oldcastle," by Gilpin.

**OLDENBURG**, a grand-duchy of Northern Germany, consisting of three distinct and widely separated territories, viz., Oldenburg Proper, the principality of Lubeck, and the principality of Birkenfeld. The collective area of these districts is now 2461 square miles. Pop. in 1875, 319,314. Oldenburg Proper, which comprises  $\frac{2}{3}$ ths of this area, and 4-5ths of the entire population, is bounded on the n. by the German Ocean, on the e., s., and w. by the kingdom of Hanover. The principal rivers of O. are the Weser, the Jahde, and the Hase, Veme, and other tributaries of the Ems. The grand-duchy of Oldenburg Proper is divided into eight circles. The country is flat, belonging to the great sandy plain of Northern Germany, and consists for the most part of moors, heaths, marsh or fens, and uncultivated sandy tracts; but here and there, on the banks of the rivers, the uniform level is broken by gentle acclivities, covered with wood, or by picturesque lakes surrounded by fruitful pasture-lands. Agriculture and the rearing of cattle constitute the chief sources of wealth. The horses and cattle raised in the marsh-lands are excellent of their kind, and in great request; the horse-markets at Oldenburg, and the cattle-sales at Ovelgönne, being frequented by purchasers from every part of Germany. The scarcity of wood

for fuel, and the absence of coal, are compensated for by the existence of turf-beds of enormous extent. With the exception of some linen and stocking looms, and a few tobacco-works, there are no manufactories. There are, however, numerous distilleries, breweries, and tan-yards in all parts of the duchy.

The trade is principally a coasting-trade, carried on in small vessels, from 20 to 40 tons, which can thread their way along the shallow channels connecting the larger rivers.

The exports are horses, cattle, linens, thread, hides, and rags, which find their way chiefly to Holland and the Hanseatic cities; while the imports include the ordinary colonial goods, and manufactures of numerous kinds.

The receipts for the collective grand-duchy were, in the budget for 1873, 7,104,150 marks, and the expenditure, 7,546,390. The public debt, at the close of 1874, was 34,575,942 marks.

The principality of Lübeck, consisting of the secularised territories of the former bishopric of the same name, is surrounded by the duchy of Holstein, and is situated on the banks of the rivers Schwartau and Trave. It contributes 199 square miles to the general area of the grand-duchy, and 34,085 inhabitants to the collective population. It is divided into four administrative districts. It has several large lakes, as those of Plöön—noted for its picturesque beauty—Keller, Ukloie, and Gross-Kutin; while in regard to climate, soil, and natural products, it participates in the general physical characteristics of Holstein. The chief town is Eutin (pop., in 1871, 5700), pleasantly situated on the lake of the same name, with a fine castle surrounded by a magnificent park.

The principality of Birkenfeld, lying south-west of the Rhine, among the Hundsrück Mountains, and between Rhenish Prussia and Lichtenberg, is an outlying territory, situated in lat.  $49^{\circ} 30'$ — $49^{\circ} 52'$  n., and in long.  $7^{\circ}$ — $7^{\circ} 30'$  e. Its area is 192 square miles, and its pop. 87,093. The soil of Birkenfeld is not generally productive; but in the lower and more sheltered valleys, it yields wheat, flax, and hemp. Wood is abundant. The mineral products, which are of considerable importance, comprise iron, copper, lead, coal, and building-stone; while in addition to the rearing of cattle, sheep, and swine, the polishing of stones, more especially agates, constitutes the principal source of industry. The principality is divided into three governmental districts.

O. is a constitutional ducal monarchy, hereditary in the male line of the reigning family. The constitution, which is based upon that of 1849, revised in 1852, is common to the three provinces, which are represented in one joint chamber, composed of 88 members, chosen by free voters. Each principality has, however, its special provincial council, the members of which are likewise elected by vote; while each governmental district within the provinces has its local board of councillors, and its several courts of law, police, finance, &c., although the highest judicial court of appeal, and the ecclesiastical and ministerial offices, are located at Oldenburg.

Perfect liberty of conscience was guaranteed by the constitution of 1849. The Lutheran is the predominant church, upwards of 200,000 of the population belonging to that denomination; while about 70,000 persons profess the Roman Catholic religion.

There are two gymnasia, one higher provincial college, several secondary, and 500 elementary schools; but in consequence of the scarcity of villages in the duchy, and the isolated position of many of the houses of the peasantry, schools are not common in the country districts, and the standard of education of the lower classes is, from these causes, scarcely equal to that existing in other parts of Northern Germany. The military forces of O.—above 2000 men on the peace footing—form a portion of the Prussian army. The merchant navy in 1875 consisted of 361 vessels of 53,167 tons. O. is represented in the Bundesrath or Federal Council of the German Empire by 1 member, and in the Reichstag or Diet by 3 members.

*History.*—The territory now included in the grand-duchy of O., was in ancient times occupied by the Teutonic race of the Chauci, who were subsequently merged with the more generally known Frisii, or Frisians; and the land, under the names of Ammergau and Lerigan, was for a long period included among the dominions of the Dukes of Saxony. In 1180, the Counts of O. and Delmenhorst succeeded in

establishing independent states from the territories of Henry the Lion, which fell into a condition of disorganisation after his downfall.

This family has continued to rule O. to the present day, giving, moreover, new dynasties to the kingdom of Denmark, the empire of Russia, and the kingdom of Sweden. See OLDENBURG, HOUSE OF. On the death, in 1667, of Count Anthony Gunther, the wisest and best of the O. rulers, his dominions, in default of nearer heirs, fell to the Danish reigning family, and continued for a century to be ruled by viceroys nominated by the kings of Denmark. This union was, however, severed in 1773, when, by a family compact, Christian VII. made over his O. territories to the Grand Duke Paul of Russia, who represented the Holstein-Gottorp branch of the family. Paul having renounced the joint countships of Delmenhorst and O. in favor of his cousin, Frederick Augustus, of the younger or Kiel line, of the House of O., who was Prince-bishop of Lübeck, the emperor raised the united O. territories to the rank of a duchy. The present reigning family is descended from Duke Peter Friedrich Ludwig, cousin to the Prince-bishop, Frederick Augustus. For a time, the Duke was a member of Napoleon's Rhenish Confederation; but French troops having, in spite of this bond of alliance, taken forcible possession of the duchy in 1811, and incorporated it with the French empire, the ejected prince joined the ranks of the allies. In recognition of this adhesion, the Congress of Vienna transferred certain portions of territory, with 6000 Hanoverians and 20,000 inhabitants of the quondam French district of the Saar, to the O. allegiance. From these new acquisitions were organised the district Amme, and the principality of Birkenfeld; while O. was raised to the dignity of a grand-duchy. The revolutionary movement of 1848 was quite as productive of violent and compulsory political changes in this as in other German states; and in 1849, after having existed for centuries without even a show of constitutional or legislative freedom, it entered suddenly into possession of the most extreme of liberal constitutions. The reaction in favor of absolutism, which the licence and want of purpose of the popular party naturally induced all over Germany, led in 1852 to a revision and modification of the constitution, which, however, in its present form contains the essential principles of popular liberty and security, though it must be confessed this is more verbal than real. In the German-Italian war, O. sided with Prussia, and afterwards joined the North German Confederation. The duchy concluded, in 1866, a treaty with Prussia, by which the Grand-Duke renounced his claims to the Holstein succession, for the cession to him of a small portion of Holstein territory, and an indemnity of 1,000,000 thalers. O. is now included in the German Empire.

OLDENBURG, capital of the grand-duchy of the same name, is pleasantly situated on the banks of the navigable river Hunte, 25 miles west-north-west of Bremen. Pop. (1871) 18,574. O. is the seat of the administrative departments, and the focus of the literary, scientific, and commercial activity of the duchy. It has a normal school, a military academy, a public library of 85,000 vols., a picture-gallery, museum, &c. The grand-ducal palace is worthy of note for its fine gardens, its valuable pictures, and other art collections, and its library. The principal church is St Lambert's, containing the burying-vaults of the reigning family. O. is the seat of an active river-trade, and is noted for its excellent studs, and the great cattle and horse fairs which are annually held here in the months of June and August.

OLDENBURG, The House of, which lays just claim to being one of the oldest reigning families of Europe, has been rendered still more illustrious by various matrimonial alliances, which, in the course of ages, have successively been the means of creating new royal dynasties. Thus, for instance, in 1449, a scion of this House being elected king of Denmark, under the title of Christian I., became the progenitor of the Danish House of Oldenburg, the Imperial House of Russia, the late royal family of Sweden, and the collateral and junior Danish lines of Augustenburg, Kiel, and Sonderburg-Glücksburg. Christian owed his election to the recommendation of his maternal uncle, Duke Adolph of Slesvig, who, when the throne was offered to him on the sudden death of King Christopher, refused, on the ground of age, and proposed Christian of Oldenburg, who, as the direct descendant of Eric Gipping's daughter, Princess Richissa, was allied to the old extinct House of Denmark. The death, in 1459, of Adolph, Duke of Slesvig and Count of Holstein, without male heirs, opened the question of succession to

those states, which has since become one of such vexatious import. The ancient law of Denmark recognised hereditary fiefs only in exceptional cases; crown fiefs being generally held for life or merely for a time *ad gratiam*. Such being the case, Slesvig might, on the death of Adolph, have been taken by the crown as a lapsed tenure; but Holstein, being held under the empire, would have been separated from it. Adolph and his subjects were alike anxious that Slesvig and Holstein should continue united; but although the Slesvig estates, at the wish of the Duke Adolph, had recognised Christian as successor to the duchy before his accession to the throne of Denmark, the Holstein Chambers were divided on the question of succession, the majority shewing a preference for the claims of the counts of Schauenburg, who were descended from *male* agnates of the Holstein House. Christian, in his eagerness to secure both states, was willing to sacrifice his rights in Slesvig to his schemes in regard to Holstein; and having bought over the Holstein nobles by bribes and fair promises, he was elected Duke of Slesvig and Count of Holstein at Ribe in 1460, where he signed a deed, alike derogatory to the interests and unworthy the dignity of his crown. In this compact, by which he bartered away the just prerogatives and independence of himself and his successors, for the sake of nominal present gain, he pledged his word for himself and his heirs, that the two provinces should always remain undivided, "*ewig bliben tosamende ungedeelt*," and not be dismembered by division or heritage. This document, which remained for ages unknown or forgotten, was discovered by the historian Dahlmann amid the neglected papers of the Holstein state archives at Preetz, and proclaimed in 1843 by that ardent admirer of Germany as the unchangeable fundamental law of the Slesvig-Holstein provinces. The confusion, dissension, and ill-will to which this fatal deed has given rise, are the fruits which Christian's unscrupulous desire to secure power at any cost has produced for his descendants, whose complicated claims on the duchies resulted, in 1864, in a war which cost Denmark a large portion of her territorial possession. From Christian I. descend two distinct branches of the Oldenburg line: 1. The royal dynasty, extinct in the male line in Frederick VII., late king of Denmark, and the collateral branches of Sonderburg-Angustenburg, and Sonderburg-Glücksburg; 2. The ducal Holstein-Gottorp line, descended from Duke Adolph, who died in 1586, and was the second son of King Frederick I. This prince had received, during his father's lifetime, a portion of the Slesvig and Holstein lands, which he was permitted, on the accession of his elder brother, Christian III., to retain for himself and his heirs. This line became illustrious by the marriage of Prince Karl Friedrich, the son of Hedwig-Sofia, eldest sister of Charles XII. of Sweden (a direct descendant of Duke Adolph) with the Grand-duchess Anna, daughter of Peter the Great, and thus gave to Russia the dynasty which still occupies the Imperial throne; while Adolph-Friedrich, a cousin of Prince Karl Friedrich, by his election to the throne of Sweden in 1751, added another crown to those already held by the House of Oldenburg. The conduct of his descendants rendered the new dignity short-lived, for with the abdication of Gustavus IV., in 1809, the Holstein-Gottorp dynasty became extinct in Sweden.

The complicated relations of the House of O. in regard to the Danish succession, after giving rise to much angry discussion among the princes interested in the question, and the Danish people themselves, led the great powers to enter into a treaty, known as the London Treaty of 1852, for settling the question of succession, on the ground that the integrity of the Danish monarchy was intimately connected with the maintenance of the balance of power and the cause of peace in Europe. England, France, Austria, Prussia, Russia, Sweden, and Denmark, were parties to this treaty, in the first article of which it was provided, that on the extinction of the male line of the Royal House, Prince Christian of Slesvig-Holstein-Sonderburg-Glücksburg, and his male heirs, according to the order of primogeniture, should succeed to all the dominions, then united under the sway of the king of Denmark. The rights of succession, which rested with the Angustenburg family, were forfeited by a compact which the Duke of Angustenburg entered into for the surrender of his claims in consideration of a sum of money paid to him by Denmark. The Duke's inorganic marriage, and his subsequent rebellion, in 1848, against the Danish king, were the causes which led to the arrangement of this family compact on the existing terms. This treaty, known as the London Protocol of May 1852, was followed in October of

the same year by the publication of a supplementary clause, which stipulated, that on the extinction of the heir-male of Prince Christian of Slesvig-Holstein-Sonderburg-Glücksburg, the Holstein-Gottorp, or imperial Russian line should succeed to the Danish dominions. This article, even more than the original clauses of the treaty, met with the strongest opposition among the Danes, and after being twice rejected in the Landsthing, the London Treaty was only ratified after a new election of members, and on the assurance of the king that in excluding all female cognate lines from the succession, there was no definite intention of advancing the claims of Russia. King Frederick's death, in 1863, brought on the crisis of the much-vexed question of the Danish succession; and although the London Treaty was so far followed that Prince Christian succeeded as king of Denmark, the evils that were anticipated from the measure were in 1864 made painfully manifest; for the Duke of Augustenburg, notwithstanding the renunciation by his family of all claims to the succession, appealed to the federal diet for the recognition of his rights on Holstein; and the German powers, glad of a pretext to extend their influence beyond the Elbe, occupied the Slesvig-Holstein (q. v.) territory, and succeeded, by force of superior numbers, in advancing the boundary of Germany to the borders of Jutland. This led, however, to grave results affecting the whole of Europe. Prussia and Austria took possession of the conquests in their own names. The former power offered the latter pecuniary compensation for their assistance in the war, while indicating a determination to annex the duchies to its own dominions. Austria refused, and this led to the disastrous battle of Königgratz.

**OLDHAM**, a parliamentary borough and flourishing manufacturing town of England, in the county of Lancashire, stands on the Medlock, six miles north-east of Manchester. It owes its rapid increase in population and in wealth to the extensive coal mines in the vicinity, and to its cotton manufactures, which have increased remarkably within late years. It is not only the great centre of the hat manufacture, but is also celebrated for its manufactures of fustians, velveteens, cords, cotton, woollen, and silk goods. Numerous silk mills, brass and iron foundries, machine shops, tanneries, rope works, &c., are in operation. The parish church, the town-hall, the Blue-coat and the Grammar-schools, are the chief edifices. Pop. in 1871 of municipal borough, 88,629; of parliamentary borough (which returns two members to parliament), 118,100.

**OLDHAMIA**, a genus of fossil zoophytes, dedicated by Forbes to Professor Oldham, who was their discoverer. Only two species are known, but they are of peculiar interest, because, with their associated worm-tracks and burrows, they are the first distinct evidence of life on the globe. They exist as mere tracings on the surface of the laminae of metamorphosed shales, all remains of the substance of the organism having entirely disappeared. The form of the hard polyplidom is preserved, and shews a jointed main stem, giving off at each joint, in the one species, a circle of simple rays, and in the other a fan-shaped group. Forbes pointed out their affinities in some respects to the Hydrozoa, and in others to the Polyzoa. Kinahan, who described the genus at some length, considers them to have been Hydrozoa allied to Scutellaria; while Huxley places them among the Polyzoa.

**OLDYS**, William, a most erudite and industrious bibliographer, was a natural son of Dr William Oldys, Chancellor of Lincoln, and advocate of the Admiralty Court, and was born in 1687. Regarding his early life, little is known. His father dying in 1708, left him a small property, which O. squandered as soon as he got it into his own hands. The most of his life was spent as a bookseller's hack. He drank hard; and was so scandalously fond of low company, that he preferred to live within the "ranks" of the Fleet Prison to any more respectable place. As may easily be supposed from his habits, the dissolute old bookworm was often in extremely necessitous circumstances, and when he died (April 15, 1761), he left hardly enough to decently bury him. It is but fair to add that O. had some sterling merits. Captain Grose, who knew him, praises his good-nature, honor, and integrity as a historian, and says that "nothing would ever have biased him to insert any fact in his writings which he did not believe, or to suppress any he did." For about ten years, O. acted as librarian to the Earl of Oxford, whose valuable collection of books and MSS. he arranged and catalogued. His chief works are "The British Librarian, exhibiting a Compendious Review of all Unpublished and Valuable Books in all

Sciences" (London, 1737, anonymously); a "Life of Sir Walter Raleigh," prefixed to Raleigh's "History of the World" (1738); a translation of Camden's "Britannia" (3 vols.); "The Harleian Miscellany, or a Collection of Scarce, Curious, and Entertaining Tracts" (8 vols. Lond. 1753). Besides these, O. wrote a great variety of miscellaneous literary and bibliographical "articles" for his friends the booksellers, which it would be tedious to mention.

**OLEA'CEÆ**, a natural order of exogenous plants, consisting of trees and shrubs, with opposite leaves, and flowers in racemes or panicles. The calyx is in one piece, divided, persistent; the corolla is hypogynous, generally 4-cleft, sometimes of four petals, sometimes wanting; there are generally two, rarely four stamens; the ovary is free, 2-celled, the cells 2-seeded; the fruit is a drupe, a capsule, or a samara (see these heads); the cotyledons are foliaceous. Nearly 150 species are known, mostly natives of temperate countries. Among them are the olive, ash, lilac, privet, phillyrea, fringe tree, &c. Between some of these there is a great dissimilarity, so that this order is apt to be regarded as a very heterogeneous group; but the real affinity of the species composing it is manifested by the fact, that even those which seem most unlike can be grafted one upon another, as the lilac or the olive on the ash. Bitter, astringent, and tonic properties are prevalent in this order.

**OLEA'NDER** (*Nerium*), a genus of plants of the natural order *Apocynaceæ*, having a 5-parted calyx, set round on the inside at the base with many tooth-like points or glands, a salver-shaped 5-cleft corolla, in the throat of which is a 5-parted and toothed or lacerated corona, five stamens, the anthers adhering to the stigma, the fruit composed of two follicles. The species are evergreen shrubs with leathery leaves, which are opposite, or in threes; the flowers in false umbels, terminal or axillary. **THE COMMON O.** (*N. oleander*), a native of the south of Europe, the north of Africa, and many of the warmer temperate parts of Asia, is frequently planted in many countries as an ornamental shrub, and is not uncommon in Britain as a window-plant. It has beautiful red, or sometimes white, flowers. The English call it **ROSE BAY**, and the French **ROSE LAUREL** (*Laurier Rose*). It attains a height of eight or ten feet. Its flowers give a splendid appearance to many ruins in the south of Italy. It delights in moist situations, and is often found near streams. All parts of it contain a bitter and narcotic-acrid juice, poisonous to men and cattle, which flows out as a white milk when young twigs are broken off. Cases of poisoning have occurred by children eating its flowers, and even by the use of the wood for spits or skewers in roasting meat. Its exhalations are injurious to those who remain long under their influence, particularly to those who sleep under it. A decoction of the leaves or bark is much used in the south of France as a wash to cure cutaneous maladies.—*N. odoratum*, an Indian species, has larger flowers, which are very fragrant.—*N. piscidium* (or *Eschaltum piscidium*) a perennial climber, a native of the Kasya Hills, has a very fibrous bark, the fibre of which is used in India as hemp. The steeping of the stems in ponds kills fish.

**OLEA'STER.** See **ELÆAGNUS**.

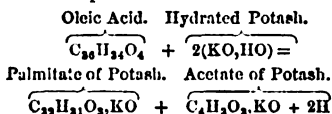
**O'LEFIANT GAS** ( $C_4H_4$ ) is transparent and colorless, possesses a disagreeable alliaceous odor, and acts as a poison when breathed. Its specific gravity is 0.981. It takes fire when brought in contact with a flame, and burns with a bright clear light. When this gas is mixed with oxygen or atmospheric air in the proportion of 1 volume with 8 volumes of oxygen, or with 15 volumes of atmospheric air, it forms a powerfully explosive mixture. It is more soluble in cold than in hot water—100 volumes of water at 32° absorbing 26.5 volumes of the gas, while at 65° they only absorb 14 volumes. It was liquefied by Faraday, under great pressure, but remained unfrozen at -166°. If it be conducted through strongly heated tubes, or if a continuous series of electric sparks be passed through it, it is decomposed into a very dense black carbon, and double its own volume of hydrogen; and if it is subjected to a less intense heat, the products of decomposition are carbon and light carburetted hydrogen or marsh gas ( $C_2H_4$ ). Chlorine acts upon this gas in a very remarkable manner. When the two gases are mixed in equal volumes, they combine to form a heavy oily liquid, to which the term chloride of olefant gas, or Dutch Liquid (q. v.), is given. It is from this reaction that the term *olefant* was originally applied to this gas.

Olefant gas is a constituent of the gaseous explosive admixtures that accumulate

in coal-pits, and of the gaseous products yielded by the distillation of wood, resinous matters, and coal; and the brightness of the flame of ordinary gas is in a great measure dependent upon the quantity of olefant gas that is present.

This gas is most readily obtained by the action of oil of vitriol on alcohol; the reactions that ensue are too complicated to be described in these pages.

**OLEIC ACID** ( $C_{18}H_{34}O_2$ , HO), at temperatures above  $57^\circ$ , exists as a colorless limpid fluid, of an oily consistence, devoid of smell and taste, and (if it has not been exposed to air) exerting no action on vegetable colors. At  $40^\circ$ , it solidifies into a firm, white, crystalline mass, and in this state it undergoes no change in the air; but when fluid, it readily absorbs oxygen, becomes yellow and rancid, and exhibits a strong acid reaction with litmus paper. It is not a volatile acid, and on the application of a strong heat, it breaks up into several substances, such as caproic, caprylic, and sebacic acids—the last-named being the most characteristic product of the distillation. If oleic acid be exposed to the action of hyponitric acid ( $NO_2$ ), it is converted into an isomeric, solid, fatty acid, termed *elaidic acid*. A very small quantity of hyponitric acid (1 part to 200 of oleic acid) is sufficient to effect this remarkable change, the nature of which is unknown. When distilled with moderately strong nitric acid, it is oxidized into a large number of products, including all the volatile fatty acids represented by the formula  $C_nH_{2n}O_2$ , from formic acid ( $C_1H_2O_2$ ) to capric acid ( $C_{10}H_{20}O_2$ ), with six fixed dibasic acids of the formula  $C_nH_{2n-2}O_8$ , viz., succinic acid, lipoic acid, adipic acid, pimelic acid, suberic acid, and azelaic (or lepagylic) acid. When heated with hydrated potash, it breaks up into palmitic and acetic acids, as shown in the equation:



These decompositions and disintegrations seem to illustrate the facility with which, by the mere process of oxidation, which is perpetually at work in living structures, one organic acid can be converted into others.

Oleic acid is a constituent of *Oleine* (q. v.), which exists in most of the fats and fatty oils of the animal and vegetable kingdoms, and most abundantly in the liquid fats or oils, and hence its name is derived. It is very difficult to obtain the acid in a state of purity, in consequence of the readiness with which it oxidises; and we shall not enter into details regarding the method of its preparation. It is obtained in a crude form, as a secondary product, in the manufacture of stearine candles; but almond oil is generally employed when the pure acid is required.

Oleic acid forms normal (or neutral) and acid salts; but the only compounds of this class that require notice are the normal salts of the alkalies. These are all soluble, and by the evaporation of their aqueous solution, form *soaps*. Oleate of potash forms a soft soap, which is the chief ingredient in Naples soap; while oleate of soda is a hard soap, which enters largely into the composition of Marseille soap.

The oleates of the alkalies occur in the animal body, in the blood, chyle, lymph, and bile; they have also been found in pus, in pulmonary tubercles, and in the excrements, after the administration of purgatives.

**OLEINE** ( $C_{18}H_{34}O_2$ ) is proved by the researches of Berthelot, to be a triglyceride of oleic acid. See GLYCERINE. Pure oleine is a colorless and inodorous oil, which solidifies into acicular crystals at about  $28^\circ$ , is insoluble in water, and only slightly soluble in cold alcohol, but dissolves in ether in all proportions. By exposure to the air, it darkens in color, becomes acid and rancid, (from the gradual decomposition of the oleic acid), and finally assumes a resinoid appearance. Hyponitric acid converts it into an isomeric, white, solid fat, named *elaidine*—the glyceride of the elaidic acid described in the preceding article.

Pure oleine is obtained by cooling olive oil to  $32^\circ$ , which occasions the separation of the stearine and palmitine in a solid form. The fluid portion is then dissolved in alcohol, which, on being cooled to  $32^\circ$ , deposits in a solid form everything but oleine,



**Oleometer**  
**O.iphant**

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which is obtained in a pure state by driving off by heat the alcohol from the decanted or filtered solution.

The drying oils, such as those of linseed, hemp, walnut, poppy, &c., contain a variety of oleine, which is not converted into elaidine by the action of hyponitric acid, or of subnitrate of mercury, which, when prepared without the aid of heat, contains enough of the acid to produce a similar effect. Hence, these substances may be used to detect fraudulent adulterations of olive or almond oil with poppy and other cheap drying oils.

**OLEOMETER**, or **Elaiometer**, an instrument for ascertaining the densities of fixed oils. It consists of a very delicate thermometer-tube, the bulb being large in proportion to the stem. It is divided into fifty degrees, and floats at zero in pure oil of poppy-seed, at  $38^{\circ}$  to  $38\frac{1}{4}^{\circ}$  in pure oil of almonds, and at  $50^{\circ}$  in pure olive oil.

**O'LEOPHOSPHORIC ACID** is a yellow viscid substance, which is insoluble in water and cold alcohol, but dissolves readily in boiling alcohol and in ether. When boiled for a long time with water or with alcohol, or when treated with an acid, it resolves itself into oleine and phosphoric acid; while alkalies decompose it into phosphoric acid, oleates, and glycerine. It exists, according to Frémy and other chemists, in the brain, spinal cord, kidneys, and liver.

**OLÉRON**, Isle of (anc. *Uliarus*), an island of France, forming a portion of the department of Charente-Inférieure, lies off the west coast of France, opposite the mouth of the river Charente. It is 19 miles long, and about 5 miles broad, and is unusually fertile, producing abundantly all the crops grown in the department to which it belongs. See **CHARENTE-INFÉRIEURE**. At its northern extremity, is the light-house of Chassiron. In the seaport of Oléron, distilleries, rope-walks, and ship-building yards are in operation. The town of Sainte-Pierre-d'Oléron (pop. 1575) stands near the centre of the island. The pop of the island is given at 10,000.

**OLÉRON**, Laws of, or **Jugements d'Oléron**, a celebrated code of maritime law compiled in France in the reign of St Louis, and so named from a groundless story, that it was enacted by Richard I. of England during the time that his expedition to Palestine lay at anchor at that island. The real origin of these laws was a written code, called "Il Consolato del Mare," of about the middle of the 13th c., compiled either at Barcelona or at Pisa, forming the established usages of Venice and the other Mediterranean states, and acceded to by the kings of France and counts of Provence. Besides containing regulations simply mercantile, this system defined the mutual rights of belligerent and neutral vessels, as they have been since understood in modern international law. The so-called laws of Oléron were a code of regulations borrowed from the "Consolato," which for several centuries were adopted as the basis of their maritime law by all the nations of Europe. Copies of the "Jugements d'Oléron" are appended to some ancient editions of the "Coutumier de Normandie." See **NORMANDY**, CUSTOMARY LAW OF.

**OLGA**, St, a saint of the Russian Church, wife of the Duke Igor of Kiev, who, having undertaken an expedition against Constantinople, which proved unsuccessful, was slain on his return to his own dominions. His widow O. avenged his death, assumed the government in his stead, and for many years governed with much prudence and success. Having resigned the government to her son Vratsislaf about the year 963, she retired to Constantinople, where she was baptized, by the patriarch Theophilaktos, and received into the church, assuming at baptism the name of Helena, in honor of St Helena, mother of Constantine. She returned to Russia, and labored with much zeal for the propagation of her new creed; but she failed in her attempts to induce her son, Svântoslav, to embrace Christianity. Her grandson, Vladimir, having married Chrysoberga, the sister of the emperors of Constantinople, Basil and Constantine, was baptized in the year 988; but his grandmother did not live to enjoy this gratification, having died in 978, or, according to other authorities, as early as 970. She is held in high veneration in the Russian Church. Her festival is held on July 21, and the practice of venerating her appears to date from the early period of the Russian Church, before the schism between the Eastern and Western churches.

**OLHAO'**, a town of Portugal, on the sea-coast, near Cape de St Maria, and five miles east from Faro. Pop. 1025.

**OL'BANUM**, a gum-resin, which flows from incisions made in *Boswellia serrata*, a tree found in some parts of the East. See **BOSWELLIA**. It is the *Lebanah* of the Hebrews, *Libanos* or *Libanotos* of the Greeks, *Thus* of the Romans, of all which terms the ordinary English translation is *Frankincense* (q. v.). It occurs in commerce in semi-transparent yellowish tears and masses; has a bitter nauseous taste; is hard, brittle, and capable of being pulverised; and diffuses a strong aromatic odor when burned. It was formerly used in medicine, chiefly to restrain excessive mucous discharges; but its use for such purposes is now rare. It sometimes enters as an ingredient into stimulating plasters. It is chiefly employed for fumigation, and is used as incense in Roman Catholic churches. It is sometimes distinctively called *Indian O.*; a similar substance, in smaller tears, called *African O.*, being produced by *Boswellia papyrifera*, a tree found growing on bare limestone rocks in the east of Abyssinia, and sending its roots to a great depth into the crevices of the rock. The middle layers of the bark are of fine texture, and are used instead of paper for writing.

**OLIFANT'S RIVER**. Two considerable streams of this name are found in the Cape Colony. The Olifant's River West rises in the Winterhoek Mountains, and enters the Atlantic in lat.  $31^{\circ} 40'$ , after a course of 150 miles, and a basin of drainage of 25,000 square miles.—The Olifant's River East drains a great part of the district of George, and joins the Gauritz River 60 miles above the entrance of that river into the sea. Its course is upwards of 150 miles in length, and it is more available for irrigation than almost any other Cape river.

**OLIGARCHY** (*oligos*, few, and *archo*, to govern), a term applied by Greek political writers to that perversion of an aristocracy in which the rule of the dominant part of the community ceases to be the exponent of the general interests of the state, owing to the cessation of those substantial grounds of pre-eminence in which an aristocracy originated. The governing power in these circumstances becomes a faction, whose efforts are chiefly devoted to their own aggrandisement and the extension of their power and privileges.

**OLINDA**, a city of Brazil, in the province of Pernambuco, and four miles north-east from Pernambuco. It was formerly the capital of the province, and there were bloody contests between Spain and Holland for the possession of it. It is still a bishop's seat, Pernambuco being included in the diocese. The whole aspect of the town is that of a place half deserted. Pop. 8000.

**OLINDA**, a suburb of Pernambuco (q. v.).

**OLIPHANT**, Mrs Margaret (*née* Wilson), one of the most distinguished of our living female novelists, was born about the year 1820. The prevalent impression that she is a Scotchwoman, naturally enough derived from the obvious fondness with which in her earlier works she has treated Scottish character and incident, is not strictly correct. She is a native of Liverpool; her mother was, however, a Scotchwoman of a somewhat remarkable type, strongly attached to old traditions. In 1849, Mrs O. published her first work, "Passages in the Life of Mrs Margaret Maitland of Sunnyside," which instantly won attention and approval. Its most distinctive charm is the tender humor and insight which regulate its exquisite delineation of Scottish life and character at once in their higher and lower levels. This work was followed by "Merkland" (1851); "Adam Graeme of Mossgrey" (1852); "Harry Muir" (1853); "Magdalen Hepburn" (1854); "Lilliesleaf" (1855); and subsequently by "Zaldee," "Katie Stewart," and "The Quiet Heart," which originally appeared in succession in "Blackwood's Magazine." Though these are of somewhat various merit, in all of them the peculiar talent of the writer is marked. They are rich in the minute detail which is dear to the womanly mind; have nice and subtle insights into character, a flavor of quiet humor, and frequent traits of delicacy and pathos in the treatment of the gentler emotions. It is, however, on the "Chronicles of Carlingford" that her reputation as a novelist was first secured. In the first of the two sections separately published, apart from its other merits, which are great, the character of little Netty, the heroine, vivifies the whole work, and may rank as an original creation. The other, "Salen Chapel," perhaps indicates a wider and more vigorous grasp than is to be found in any other work of the authoress. Certain of the unlovelier features of English dissent, as exhibited in

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a small provincial community, are here graphically sketched, and adapted with admirable skill to the purposes of fiction. The intrusion, however, in some portion of the work of a "sensational" element, as it is termed, though it subserves intensity of interest, must be noted as a little defective in art. In 1870, she published "Three Brothers;" in 1871, "Squire Arden;" in 1872, the most subtly thought and gracefully written of all her novels, "Ombra;" in 1874, "A Rose in June;" and in 1876, "Phoebe Junior. Mrs O. has also published "Life of Edward Irving;" "St Francis of Assisi;" "Memoir of the Comte de Montalembert;" and "The Masters of Florence."

OLIVAREZ, Don Gasparo de Guzman, Count of, Duke of San Lucar, and prime-minister of Philip IV. of Spain, was born on January 6, 1687, at Rome, where his father was ambassador. He belonged to a distinguished but impoverished family, received a learned education, became the friend of Philip IV., his confidant in his amours, and afterwards his prime-minister, in which capacity he exercised almost unlimited power for twenty-two years. O. shewed ability for government, but his constant endeavor was to wring money from the country that he might carry on wars. His oppressive measures caused insurrections in Catalonia and Andalusia, and roused the Portuguese to shake off the Spanish yoke in 1640, and make the Duke of Braganza their king, an event which O. reported to Philip with satisfaction, as it enabled him to confiscate the duke's great estates in Spain. But the arms of Spain being unsuccessful, the king was obliged to dismiss the minister in 1643. He would probably have been recalled to the head of affairs, but for a publication in which he gave offence to many persons of influence. He was ordered to retire to Toro, and confine himself to that place, where he died, 12th July 1645. (Cespedes, "Hist. De Felipe IV.")

OLIVE (*Olea*), a genus of trees and shrubs of the natural order *Oleaceæ*; having opposite, evergreen, leathery leaves, which are generally entire, smooth, and minutely scaly; small flowers in compound axillary racemes, or in thyrsi at the end of the twigs; a small 4-toothed calyx, a 4-cleft corolla, two stamens, a 2-cleft stigma; the fruit a drupe. The species are widely distributed in the warmer temperate parts of the globe. The COMMON O. (*O. Europæa*), a native of Syria and other Asiatic countries, and perhaps also of the south of Europe, although probably it is there rather naturalised than indigenous, is in its wild state a thorny shrub or small tree, but through cultivation becomes a tree of 20–40 feet high, destitute of spines. It attains a prodigious age. The cultivated varieties are very numerous, differing in the breadth of the leaves, and in other characters. The leaves resemble those of a willow, are lanceolate, entire, of a dull dark-green color above, scaly and whitish-gray beneath; the flowers small and white, in short dense racemes; the fruit greenish, whitish, violet, or even black, never larger than a pigeon's egg, generally oval, sometimes globular, or obovate, or acuminate. The fruit is produced in vast profusion, so that an old olive-tree becomes very valuable to its owner. It is chiefly from the pericarp that olive oil is obtained, not from the seed, contrary to the general rule of the vegetable kingdom. Olive oil is much used as an article of food in the countries in which it is produced, and to a smaller extent in other countries, to which it is exported also for medicinal and other uses (see OILS). Olives, gathered before they are quite ripe, are pickled in various ways, being usually first steeped in lime-water, by which they are rendered softer and milder in taste. They are well known as a restorative of the palate, and are also said to promote digestion. Disagreeable as they generally are at first, they are soon greatly relished, and in the south of Europe are even a considerable article of food. Dried olives are there also used, as well as pickled olives.—The wood of the olive-tree takes a beautiful polish, and has black cloudy spots and veins on a greenish-yellow ground; it is principally used for the finest purposes by cabinet-makers and turners. The wood of the root is marked in a peculiarly beautiful manner, and is used for making snuff-boxes and small ornamental articles. The bark of the tree is bitter and astringent; and both it and the leaves have febrifuge properties. A gum resin exudes from old stems, which much resembles storax, has an odor like vanilla, and is used in all parts of Italy for perfumery. Among the Greeks, the O. was sacred to Pallas Athene (Minerva), who was honored as the bestower of it; it was also the emblem of chastity. A crown of olive-twigs was the highest distinction of a citizen who had merited well

of his country, and the highest prize of the victor in the Olympic games. An olive branch was also the symbol of peace (compare Gen. viii. 11); and the vanquished, who came to supplicate for peace, bore olive-branches in their hands.—The O. has been cultivated in Syria, Palestine, and other parts of the east, from the earliest times. Its cultivation extends southwards as far as Cairo, and northwards to the middle of France. It is very generally propagated by suckers, but where great care is bestowed on it, inarching is practiced. It grows from cuttings. The climate of England is too cold for the O., yet in Devonshire it ripens its fruit on a south wall.—*Olea similis* and several other species are useful trees of South Africa, yielding a very hard and extremely durable wood. Some of them bear the name of Ironwood at the Cape of Good Hope. The AMERICAN O. (*O. Americana*) is also remarkable for the hardness of its wood. It is found as far north as Virginia. It is a tree of 30—35 feet high, with much broader leaves than the Common Olive. Its fruit is fit for use. Its flowers are fragrant. The FRAGRANT O. (*O. fragrans* or *Osmanthus fragrans*) of China and Japan has extremely fragrant flowers, which are used by the Chinese for flavoring tea.

OLIVENITE, a mineral, consisting chiefly of arsenic acid and protoxide of copper, with a little phosphoric acid and a little water. It is generally of some dark shade of green, sometimes brown or yellow. It is found along with different ores of copper in Cornwall and elsewhere. It is often crystallised in oblique four-sided prisms, of which the extremities are acutely bevelled, and the obtuse lateral edges sometimes truncated, or in acute double four-sided pyramids; it is sometimes also spherical, kidney-shaped, columnar, or fibrous.

OLIVENZA, a town of Spain, near the Portuguese frontier, 19 miles south-by-west from Badajoz, on a small river which flows into the Guadlana. The chief branches of industry are the expressing of oil, weaving, and the making of earthenware. From the treaty for the cession of O. by Portugal to Spain in 1801, Godoy acquired his title of Prince of the Peace. Pop. 10,000.

OLIVES. Mount of, called also Mount Olivet, an inconsiderable ridge lying on the east side of Jerusalem, from which it is only separated by the narrow Valley of Jehosaphat. It is called by the modern Arabs Jebel-el-Tur, and takes its familiar name from a magnificent grove of olive-trees which once stood on its western flank, but has now in great part disappeared. The road to Mount Olivet is through St Stephen's Gate, and leads by a stone bridge over the now almost waterless brook Cedron. Immediately beyond, at the foot of the bridge, lies the Garden of Gethsemane; and the road here parts into two branches, northwards towards Galilee, and eastwards to Jericho. The ridge rises in three peaks, the central one of which is 2556 feet above the level of the sea, and 416 feet above the Valley of Jehosaphat. The southern summit is now called "The Mount of Offence," and was the scene of the idolatrous worship established by Solomon for his foreign wives and concubines. The northern peak is the supposed scene of the appearance of the angels to the disciples after the resurrection, and is remarkable in Jewish history as the place in which Titus formed his encampment in the expedition against the fated city of Jerusalem. But it is around the central peak, which is the Mount of O. properly so called, that all the most sacred associations of Christian history converge. On the summit stands the Church of the Ascension, built originally by St Helen, the modern church being now in the hands of the Armenian community; and near it are shewn the various places where, according to tradition, our Lord wept over Jerusalem, where the apostles composed the apostles' creed, where our Lord taught them the Lord's Prayer, &c. Near the Church of the Ascension is a mosque and the tomb of a Mohammedan saint. In the Garden of Gethsemane, at the foot of the hill, is shewn the scene of our Lord's agony. The northern peak spreads out into a plain of considerable extent, which is painfully notable in Jewish history as the place where, after the Jews on occasion of the revolt under Bar-Kochab, were debarred by Adrian from entering Jerusalem, they were wont to assemble annually on the anniversary of the burning of the Temple to celebrate this mournful anniversary, and to take a distant look at their beloved Jerusalem. The scene is beautifully described, and with much dramatic feeling, by St Jerome.—"Com. in Sophoniam," t. iii. p. 1666.

OLIVETANS, a religious order of the Roman Catholic Church, one of the many remarkable products of that well-known spiritual movement which characterised the

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12th and 13th centuries. The O., or Brethren of Our Lady of Mount Olivet, are an offshoot of the great Benedictine Order (q. v.) and derive their origin from John Tolomei, a native of Siena, born in the year 1272. Tolomei had been a distinguished professor of philosophy in the university of his native city; but his career was suddenly interrupted by the loss of his sight. Although he was cured of his blindness (and, as he himself believed, miraculously), this visitation convinced him of the vanity of earthly things; and in company with some friends he withdrew to a solitary place near Siena, where he devoted himself to prayer and religious exercises. By the direction of the pope, John XXII., the new brethren adopted the Benedictine rule; but they chose as their especial province the cultivation of sacred science, and the duty of teaching. In the year 1319, Tolomei was chosen as the first general; and even in his lifetime the institute made rapid progress, especially in Italy. It numbered at one time eighty houses, but at present the number is reduced to four—namely, the parent house, so called, of Monte Oliveto, in the diocese of Arezzo in Tuscany, one at Rome, one at Genoa, and one at Palermo. The O. order has produced many distinguished ecclesiastics.

OLIVINE. See CHEYSOLITE.

O'LLA PODRI'DA (literally, *putrid pot*), a Spanish term, originally signifying an accumulation of remains of flesh, vegetables, &c., thrown together into a pot, but generally employed to designate a favorite national dish of the Spaniards, consisting of a mixture of different kinds of meat and vegetables stewed together. It has also come to be figuratively applied to literary productions of very miscellaneous contents. The French equivalent is *pot-pourri*, and the Scotch *holch-potch*, both of which, but especially the former, are also employed in a figurative sense.

OLMÜTZ, the chief fortress of Moravia, Austria, is the capital of a district of the same name, and is situated in lat. 49° 36' n., and in long. 17° 15' e., on an island of the river Morava, which, by means of sluices, can be opened into the moats, and thus made available for purposes of defence. O. is the see of an archbishop, nominated by the chapter, and is the chief seat of the administrative departments. It has a university, founded in 1581, dissolved in 1778, and reorganised in 1827; a library of 80,000 vols.; good natural history, physical, and other museums; a gymnasium, an archiepiscopal seminary, artillery and infantry academies, polytechnic and other schools, a hospital, an asylum for widows and orphans, &c. The most noteworthy of its churches are the cathedral, a fine old building, and the church of St. Mauritius, completed in 1412, with its celebrated organ, having 48 stops, and more than 2000 pipes. The noble town-hall, with its complicated clock-work, set up in 1574, and the lofty column on the Oberring, with several fine fountains in the squares, and the splendid archiepiscopal palace and chapter-house, all contribute towards the picturesque aspect for which O. is distinguished. The deficiency in public gardens has of late years been in part supplied by the draining and planting of some of the inner moats, and the conversion of some portions of the fortifications into pleasure-grounds. A mile from the city lies the monastery of the Premonstratensians at Hradisch, founded in 1074, now a military hospital. O. has a few manufactories of kerseymer, cloth, linen, and porcelain, and is the seat of an extensive trade in cattle from Poland and Moldavia. Pop. (1869) 15,231. Prior to 1777, when O. was raised into an archbishopric, its bishops had long been in the enjoyment of the rank of princes of the empire. The city suffered severely during the Thirty Years' War, and again in the Seven Years' War of Silesia, when it more than once fell into the hands of the Prussians. In 1848, Ferdinand I. signed his abdication here in favor of his nephew, Franz-Joseph I.; while in 1850, O. was chosen as the place of conference between the Prussian, Austrian, and Russian plenipotentiaries, for the adjustment of the conflicting differences which had arisen in the German states generally, as the result of the revolutionary movement of 1848.

OLONE'TZ, a government in the north of Russia, bounded on the w. by Finland, and on the e. and n. e. by Archangel. Area, exclusive of water, 49,104 sq. miles. Pop. (1870) 296,392. Large lakes abound in this government, the chief, after Lake Onega (q. v.), being Lakes Wygo and Sego. The surface is in general elevated, and about four-fifths of it are covered with wood. The soil is sterile, and the climate is cold and damp. The wealth of the government consists principally in its minerals. Its iron-mines supply the ironworks of Petrasowodsk, and from its quarries marbles

are sent to St Petersburg. The principal employments of the inhabitants, who are principally Russians and Finns, and belong to the Greek Church, are carving in wood, fishing and hunting. Many of them also are employed in the ironworks and quarries. The women weave and spin. The government derives its name from the small but ancient town of Olouetz. Petrasowodsk is the centre of administration.

**OLORON**, or Oloron-Sainte-Marie, a town of France, in the department of Basses-Pyrénées, on the Gave d'Oloron, 15 miles south-west of Pau. The Church of St Marie is in the transition style from Romanesque to Gothic. The principal articles of manufacture are the chequered handkerchiefs which form the favorite head-dresses of the peasantry of Aragon and Gascony, and also the "barrets" or caps of the Béarnais. Pop. (1872) 7175.

**O'LOT**, a town of Spain, in the province of Gerona, and 22 miles north-west from Gerona, near the base of the Pyrenees, on the Fluvia. There are 14 volcanic cones close to the town; the crater of the largest is a mile in circumference and 445 feet in depth. The whole district is volcanic. In many places, and even in the town itself, currents of air blow continually from the porous lava. These are called *Bufadores* and *Sopladores*, and some of them are conducted beneath houses, and used as refrigeratories in hot weather. They maintain the temperature of about 53° F. both in hot and cold weather, but the gust of air is strongest in hot weather. O. was almost destroyed by an earthquake in 1421, but was soon rebuilt. Pop. 12,070.

**OLYMPIA**, the scene of the celebrated Olympic Games (q. v.), is a beautiful valley in Elis, in the Peloponnesus, through which runs the river Alpheus. As a national sanctuary of the Greeks, O. contained within a small space, many of the choicest treasures of Grecian art belonging to all periods and states, such as temples, monuments, altars, theatres, and multitudes of images, statues, and votive-offerings, of brass and marble. In the time of the elder Pliny, there still stood here about 8000 statues. The Sacred Grove (called the *Altis*) of Olympia, enclosed a level space about 4000 feet long by nearly 3000 broad, containing both the spot appropriated to the games and the sanctuaries connected with them. It was finely wooded, and in its centre stood a clump of sycamores. The Altis was crossed from west to east by a road called the "Pompic Way," along which all the processions passed. The Alpheus bounded it on the south, the Cladeus, a tributary of the former, on the west, and rocky but gently swelling hills on the north; westward it looked towards the Ionian Sea. The most celebrated building was the *Olympieum*, or *Olympium*, dedicated to Olympian Zeus. It was designed by the architect Libon of Elis in the 6th c. B.C., but was not completed for more than a century. It contained a colossal statue of the god, the master-piece of the sculptor Phidias, and many other splendid figures; its paintings were the work of Panæus, a relative of Phidias. Next to the Olympieum ranked the *Heraeum*, dedicated to Hera, the wife of Zeus, and the Queen of Heaven, containing the table on which were placed the garlands prepared for the victors in the games; the *Pelopium*, the *Metroum*, the ten *Thesauri* or Treasuries, built for the reception of the dedicatory offerings of the Greek cities, the temples of Eleithyia and Aphrodite also deserve mention; the *Stadium* and the *Hippodrome*, where the contests took place, stood at the eastern end of the Altis. The ploughshare now passes through the scene of these contests, but many ruins still attest the ancient magnificence of the buildings. In 1875 explorations, at the expense of the German government, were undertaken at O., and already several important "finds" have been made.

**OLYMPIAD** (Gr. *olympias*), the name given to the period of four years that elapsed between two successive celebrations of the Olympic Games (q. v.); a mode of reckoning which forms the most celebrated chronological era among the Greeks. The first recorded olympiad dates from the 21st or 22d of July 776 B.C., and is frequently referred to as the Olympiad of Coræbus; for historians, instead of referring to the olympiad by its number, frequently designate it by the name of the winner of the foot-race in the Olympic games belonging to that period, though at times both the number and the name of the conqueror are given. A slight indefiniteness is frequently introduced into Greek chronology, from the custom of mentioning only the olympiad, neglecting to specify in which year of the olympiad a certain event happened. As this era commenced in 776 B.C., the first year of our present era (1 A.D.) cor-

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Olympus

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responded to the last half of the fourth year of the 194th with the first half of the first year of the 195th olympiad, and 894 A.D. corresponds to the second year of the 295d olympiad, at which time reckoning by olympiads terminated. This era is used only by writers, and is never found on coins, and very seldom on inscriptions. Another olympic era, known as the "New Olympic Era," was commenced by the Roman emperors, and dates from 131 A.D.; it is found both in writings, public documents, and inscriptions.

OLYMPIAS, the wife of Philip II., king of Macedon, and mother of Alexander the Great. She was the daughter of Neoptolemus I., king of Epirus. She possessed a vigorous understanding, but was of a most passionate, jealous, and ambitious character. Philip having, on account of disagreements, separated from her and married Cleopatra, niece of Attalus (337 B.C.), she went to reside with her brother Alexander, king of Epirus, where she incessantly fomented intrigues against her former husband, and is believed to have taken part in his assassination by Pausanias 337 B.C. On the accession of her son Alexander to the throne, she returned to Macedonia, where she contributed to bring about the murder of Cleopatra and her daughter. Alexander was filled with indignation, but O. was his mother, and he could not obey the dictates of justice. During his brief but magnificent career he always treated her with the utmost reverence and esteem, though he never allowed her to meddle with his political schemes. After his death she endeavored to get possession of the vacant throne, and obtained the support of Polysperchon in her designs. In 317, the two defeated Arrhidæus, the weak-minded step-brother and successor of Alexander, and his wife Eurydice, whom she caused to be put to death in the same year. She now began to glut her revenge on such of the Macedonian nobles as had shewn themselves hostile to her; but her cruelties soon alienated the minds of the people from her, even though she was the mother of their heroic king, whereupon Cassander (q. v.), her principal adversary, marched north from the Peloponnesus, besieged her in Pydna, and forced her to surrender in the spring of 316 B.C. She was immediately afterwards put to death. O. was a woman of heroic spirit, but of fierce and uncontrollable passions, and in the perpetration of crime, when she reckoned it necessary, displayed an unscrupulousness peculiarly feminine.

OLYMPIC GAMES, the most splendid national festival of the ancient Greeks, were celebrated every fifth year in honor of Zeus, the father of the gods, on the plain of Olympia (q. v.). Their origin goes back into prehistoric ages. According to the myth elaborated or preserved by the Elean priests, they were instituted by the Idean Herakles in the time of Kronos, father of Zeus; according to others, by the later Herakles, son of Zeus and Alkmene; while Strabo, rejecting the older and more incredible legends, attributes their origin to the Herakleidae after their conquest of the Peloponnesus. But the first glimpse of anything approaching to historic fact in connection with the games is their so-called revival by Iphitos, king of Elis, with the assistance of the Spartan law-giver, Lycurgus, about 884 B.C., or, according to others, about 828 B.C., an event commemorated by an inscription on a disc kept in the *Heræum* at Olympia, which Pausanias (flor. 2d c. A.D.) saw. That festive games were celebrated here, in other words, that Olympia was a sacred spot, long before the time of Iphitos, can indeed hardly be doubted; the universal tradition that the Elean king had only "revived" the games proves this; but nothing whatever can be historically ascertained concerning their origin, character, or frequency in this remoter time. Iphitos may, therefore, be regarded as their founder, yet the reckoning of time by Olympiads, (q. v.)—the real dawn of the historical period in Greek history—did not begin till more than a century later. At first, it is conjectured, only Peloponnesians resorted to the Olympic games, but gradually the other Greek states were attracted to them, and the festival became *Pan-Hellenic*. Originally, and for a long time, none were allowed to contend except those of pure Hellenic blood; but after the conquest of Greece by the Romans, the latter sought and obtained this honor, and both Tiberius and Nero figure in the list of Roman victors. Women—with one exception, the priestess of Demeter Chamyne—were forbidden to be present, on pain of being thrown headlong from the Tyepean Rock. The games were held from the 11th to the 15th of the Attic month *Hekatombaion* (our July—August), during which, first throughout Elis, and then throughout the rest of Greece, heralds

proclaimed the cessation of all intestine hostilities; while the territory of Elis itself was declared inviolable. The combatants were required to undergo a preparatory training for ten months in the gymnasium at Elis, and during the last of these months the gymnasium was almost as numerously attended as the games themselves. Much uncertainty prevails as to the manner in which the contests were distributed over the different days. Krause (*Olympia*, p. 106) suggests the following order: On the first day the great initiatory sacrifices were offered, after which the competitors were properly classed and arranged by the judges, and the contests of the trumpeters took place; the second day was set apart for the boys who competed with each other in foot-races, wrestling, boxing, the pentathlon, the pankration, horse-races; the third and principal day was devoted to the contests of men in foot-races of different kinds (as, for example, the simple race, once over the course; the *diaulos*, in which the competitors had to run the distance twice; and the *dolichos*, in which they had to run it seven or twelve times), wrestling, boxing, the *pankration* (in which all the powers and skill of the combatants were exhibited), and the race of *hoplites*, or men in heavy armor; on the fourth day came off the *pentathlon* (contest of five games—viz. leaping, running, throwing the *discus*, throwing the spear, and wrestling), the chariot and horse races, and perhaps the contests of the heralds; the fifth day was set apart for processions, sacrifices, and banquets to the victors (called *Olympionikoi*), who were crowned with a garland of wild olive twigs cut from a sacred tree which grew in the Altis (see OLYMPIA), and presented to the assembled people, each with a palm branch in his hand, while the heralds proclaimed his name, and that of his father and country. On his return home, he was received with extraordinary distinction; songs were sung in his praise (14 of Pindar's extant lyrics are devoted to *Olympionikoi*); statues were erected to him, both in the Altis and in his native city; a place of honor was given him at all public spectacles; he was in general exempted from public taxes, and at Athens was boarded at the expense of the state in the Prytaneion.

The regulation of the games belonged to the Eleans, from whom were chosen the *hellanodikai*, or judges, whose number varied. At first there were only two, but as the games became more and more national, and consequently more numerous, they were gradually increased to ten, sometimes even to twelve. They were instructed in their duties for ten months beforehand at Elis, and held their office only for one year. The officers who executed their commands were called *aiytai*, and were under the presidency of an *aiytarch*.—See Krause's "Olympia oder Darstellung der griechen Olympischen spiele (Wien, 1888).

OLYMPIODORUS, one of the latest of the Alexandrian Neoplatonists, flourished in the first half of the 6th c. after Christ, during the reign of the Emperor Justinian. Regarding his life nothing is known. Of his writings, we possess a "Life of Plato," with commentaries or scholia on several of his dialogues, the "Gorgias," "Philebus," "Phaedo," and "Alcibiades I." In these he appears as an acute and vigorous thinker, and as a man of great erudition. O.'s "Life of Plato" was published by Wetstein (1692), Etzwall (Lond. 1771), and Fischer (Leips. 1768); the best edition of the scholia is that of Mystoxides and Schiavus (Venice, 1816).

OLYMPUS, the ancient name of several mountains or chains of mountains—e. g., of the north-western continuation of Taurus in Mysia, of a mountain in the island of Cyprus, of one in Lycia, of another in Elis, of one on the borders of Laconia and Arcadia, and of another on the frontiers of Thessaly and Macedonia. Of these, the last-mentioned (now called *Elymbo*) is the most famous. Its eastern side, which fronts the sea, is composed of a line of vast precipices, cleft by ravines, filled with forest-trees. Oak, chestnut, beech, plane tree, are scattered abundantly along its base, and higher up appear great forests of pine, as in the days of the old poets of Greece and Rome. With Euripides, it is *poludenandros Olympus*; with Virgil, *frondosus Olympus*; and with Horace, *opacus Olympus*. Its highest peak is 9754 feet above the level of the sea, and is covered with snow for about nine months of the year. It was regarded by the ancient Greeks as the chief abode of the gods, and the palace of Zeus was supposed to be upon its broad summit. According to Greek legend, it was formerly connected with Ossa, but was separated from it by an earthquake, allowing a passage for the Peneius through the narrow vale of Tempe to the



seal. The philosophers afterwards transferred the abode of the gods to the planetary spheres, to which they likewise transferred the name of Olympus.

OM is a Sanscrit word which, on account of the mystical notions that even at an early date of Hindu civilisation were connected with it, acquired much importance in the development of Hindu religion. Its original sense is that of emphatic or solemn affirmation or assent. Thus, when in the White-Yajur-Veda (see VEDA) the sacrificer invites the gods to rejoice in his sacrifice, the god Savitr<sup>i</sup> assents to his summons by saying: "Om (i. e., be it so); proceed!" Or, when in the Brîhad-Aranyaka-Upanishad, Prajâpati, the father of gods, men, and demons, asks the gods whether they have understood his instruction; he expresses his satisfaction with their affirmative reply, in these words: "Om you have fully comprehended it;" and, in the same Upanishad, Pravâhan'a answers the question of S'wetaketu, as to whether his father has instructed him, by uttering the word "Om," i. e., "forsooth (I am)." A portion of the R'igveda, called the Altareya-Brahman'a, where describing a religious ceremony at which verses from the R'igveda, as well as songs called Gâthâs, were recited by the priest called Hotr<sup>i</sup>, and responses given by another priest, the Adhwaryu, says: "Om is the response of the Adhwaryu to the R'igveda verses (recited by the Hotr<sup>i</sup>), and likewise *tathâ* (i. e., thus) his response to the Gâthâs, for Om is (the term of assent) used by the gods, whereas *tathâ* is (the term of assent) used by men;" (the R'igveda verses being, to the orthodox Hindu, of divine, and the Gâthâs of human, authorship). In this, the original sense of the word, it is little doubtful that om is but an older and contracted form of the common Sanscrit word *avam*, "thus," which, coming from the pronominal base "a"—in some derivations changed to "e"—may have at one time occurred in the form *avam*, when, by the elision of the vowel following a—for which there are numerous analogies in Sanscrit—*avam* would become *am*, and hence, according to the ordinary phonetic laws of the language, *om*. This etymology of the word, however, seems to have been lost, even at an early period of Sanscrit literature; for another is met with in the ancient grammarians, enabling us to account for the mysticism which many religious and theological works of ancient and mediæval India suppose to inhere in it. According to this latter etymology, *om* would come from a radical *av* by means of an affix *man*, when *om* would be a curtailed form of *avman* or *oman*; and as *av* implies the notion of "protect, preserve, save," *om* would be a term implying "protection or salvation;" its mystical properties and its sanctity being inferred from its occurrence in the Vedic writings, and in connection with sacrificial acts, such as are alluded to before.

Hence *Om* became the auspicious word with which the spiritual teacher had to begin, and the pupil had to end each lesson of his reading of the Veda. "Let this syllable," the existing Prâtisâkhyâ, or grammar of the R'igveda, enjoins, "be the head of the reading of the Veda, for alike to the teacher and the pupil, it is the supreme Brahman, the gate of heaven." And Manu (q. v.) ordains: "A Brahman, at the beginning and end (of a lesson on the Veda), must always pronounce the syllable *Om*; for unless *Om* precede, his learning will slip away from him; and unless it follow, nothing will be long retained." At the time when another class of writings, the Purânas (q. v.), were added to the inspired code of Hinduism, for a similar reason, *Om* is their introductory word.

That the mysterious power which, as the foregoing quotation from the law-book of Manu shews, was attributed to this word, must have been the subject of early speculation, is obvious enough. A reason assigned for it is given by Manu himself. "Brahmâ," he says, "extracted from the three Vedas the letter *a*, the letter *u*, and the letter *m* (which combined result in *Om*), together with the (mysterious) words *Bhûh'* (earth), *Bhuvah'* (sky), and *Swah'* (heaven);" and in another verse: "These three great immutable words, preceded by the syllable *Om*, and (the sacred R'igveda verse, called) Gâyatrî, consisting of three lines, must be considered as the mouth (or entrance) of Brahman (the Veda)"—or, as the commentators observe—the means of attaining final emancipation; and "The syllable *Om* is the supreme Brahman, (three) regulated breathings (accompanied with the mental recitation of *Om*, the three mysterious words *Bhûh'*, *Bhuvah'*, *Swah'*, and the Gâyatrî), are the highest devotion. . . All rites ordained in the Veda, such as burnt and other sacrifices, pass away; but the syllable *Om* must be considered as imperishable, for it is (a symbol of) Brahman (the supreme Spirit) himself, the Lord of Creation." In these speculations, Manu bears out, and is borne out by, several Upanishads. See VEDA. In the *Kathe-*

*Upanishad*, for instance, *Yama*, the god of death, in replying to a question of Nachiketas, says: "The word which all the Vedas record, which all the modes of penance proclaim, of which desirous the religious students perform their duties, this word I will briefly tell thee, it is *Om*. This syllable means the (inferior) Brahman and the supreme (Brahman). Whoever knows this syllable, obtains whatever he wishes." And in the *Pras'na-Upanishad*, the saint Pippalāda says to Satyakāma: "The supreme and the inferior Brahman are both the word *Om*; hence the wise follows by this support the one or the other of the two. If he meditates upon its one letter (*a*) only, he is quickly born on the earth; him carry the verses of the R'igveda to the world of man; and if he is devoted there to austerity, the duties of a religious student, and faith, he enjoys greatness. But, if he meditates in his mind on its two letters (*a* and *u*), he is elevated by the verses of the Yajur-Veda to the intermediate region; he comes to the world of the moon, and having enjoyed there power, returns again (to the world of man). If, however, he meditates on the supreme Spirit by means of its three letters (*a*, *u*, and *m*), he is produced in light in the sun; as the snake is liberated from its skin, so he is liberated from sin." According to the *Mān'd'ūkya-Upanishad*, the nature of the soul is summarised in the three letters *a*, *u*, and *m*, in their isolated and combined form—*a* being *Vais'vānara*, or that form of Brahman which represents the soul in its waking condition; *u*, *Taijasa*, or that form of Brahman which represents it in its dreaming state; and *m*, *Prājña*, or that form of Brahman which represents it in its state of profound sleep (or that state in which it is temporarily united with the supreme Spirit); while *a*, *u*, *m* combined, i. e. *Om*, represent the fourth or highest condition of Brahman, "which is unaccountable, in which all manifestations have ceased, which is blissful and without duality. *Om*, therefore, is soul; and by this soul, he who knows it enters into (the supreme) soul." Passages like these may be considered as the key to the more enigmatic expressions used, for instance, by the author of the "Yoga" (q. v.) philosophy, where, in three short sentences, he says: "His (the supreme Lord's name) is *Pran'ava* (i. e., *Om*); its muttering (should be made) and reflection on its signification; thence comes the knowledge of the transcendental spirit, and the absence of the obstacles" (such as sickness, languor, doubt, &c., which obstruct the mind of an ascetic). But they indicate, at the same time, the further course which superstition took in enlarging upon the mysticism of the doctrine of the *Upanishads*. For as soon as every letter of which the word *Om* consists was fancied to embody a separate idea, it is intelligible that other sectarian explanations were grafted on them, to serve their special purposes. Thus, while *S'ankara*, the great theologian and commentator on the *Upanishads*, is still contented with an etymological punning, by means of which he transforms "*a*" (or rather "*ā*") into an abbreviation of *āpti* (pervading), since speech is pervaded by *Vais'vānara*: "*u*" into an abbreviation of *utkarsha* (superiority), since *Taijasa* is superior to *Vais'vānara*; and "*m*" into an abbreviation of *miti* (destruction), *Vais'vānara* and *Taijasa*, at the destruction and regeneration of the world, being, as it were, absorbed into *Prājña*—the *Purān'as* (q. v.) make of "*a*" a name of *Vishn'u*; of "*u*," a name of his consort *S'rī*; and of "*m*," a designation of their joint-worshipper; or they see in *a*, *u*, *m* the Triad, *Brahmā*, *Vishn'u*, and *S'iva*; the first being represented by "*a*," the second by "*u*," and the third by "*m*"—each sect, of course, identifying the combination of these letters, or *Om*, with their supreme deity. Thus, also, in the *Bhagavadgītā*, which is devoted to the worship of *Vishn'u* in his incarnation as *Krishn'a*, though it is essentially a poem of philosophical tendencies, based on the doctrine of the *Yoga*, *Krishn'a* in one passage says of himself that he is *Om*; while in another passage, he qualifies the latter as the supreme Spirit.—A common designation of the word *Om*—for instance, in the last-named passages of the *Bhagavadgītā*—is the word *Pran'ava*, which comes from a so-called radical *nu*, "praise," with the prefix *pra*, amongst other meanings, implying emphasis, and therefore literally means "eulogium, emphatic praise." Although *Om*, in its original sense, as a word of solemn or emphatic assent, is, properly speaking, restricted to the Vedic literature, it deserves notice that it is now-a-days often used by the natives of India in the sense of "yes," without, of course, any allusion to the mystical properties which are ascribed to it in the religious works. See also the article OM MAN'I PADME HŪM'.

That there exists no connection whatever, as has been supposed by some writers

Om  
Omar

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to be the case, between *Om* and *Amen*, requires scarcely any remark, after the etymological explanations given above; but it may not be without interest to observe that, though the derivation of *Om*, as a curialment of *av-man*, from *ar*, "protect, save," is probably merely artificial, and, as stated before, invented to explain the later mystical use of the Vedic word, it seems more satisfactory to compare the Latin *omen* with a Sanscrit *arman*, "protection," as derived by the grammarians from *dr* (in the Latin *drac-o*), than to explain it in the fashion of the Roman etymologists: "Omen, quod ex ore primum elatum est, osmen dictum;" or, "Omen velut oremem, quod fit ore augurium, quod non avibus aliove modo fit." And since *pra-nava*, from Sanscrit *nu*, "praise," is, like *Om*, used in the sense of "the deity," it is likewise probable that *numen* does not come, as is generally believed, from Latin *nu-(ere)*, "nod," but from a radical corresponding with the Sanscrit *nu*, "praise."

OM MAN'I PADME HUM' is the "formula of six syllables" which has acquired much celebrity from the conspicuous part which it plays in the religion of the Buddhists, and especially in that form of it called *Lamaism* (q. v.). It is the first subject which the Tibetans and Mongols teach their children, and it is the last prayer which is muttered by the dying man; the traveller repeats this formula on his journey, the shepherd when attending his flock, the housewife when performing her domestic duties, the monk when absorbed in religious meditation, &c. It is met with everywhere; on flags, rocks, trees, walls, columns, stone-monuments, domestic implements, skulls, skeletons, &c. It is looked upon as the essence of all religion and wisdom, and the means of attaining eternal bliss. "These six syllables," it is said, "concentrate in themselves the favor of all the Buddhas, and they are the root of the whole doctrine . . . ; they lead the believer to re-birth as a higher being, and are the door which bars from him inferior births; they are the torch which illuminates darkness, the conqueror of the five evils," &c. They are likewise the symbol of transmigration; each syllable successively corresponding with, and releasing from one of the six worlds in which men are re-born; or they are the mystical designation of the six transcendental virtues, each successive syllable implying self-offering (*idana*), endurance (*kshānti*), chastity (*s'ila*), contemplation (*dhyāna*), mental energy (*vīrya*), and religious wisdom (*prajñā*). The reputed author of this formula is the Dhyāni-Bodhisattwa, or deified saint, *Avalokites'wara*, or, as the Tibetans call him, *Padmapān'i* (i. e., the lotus-handed). It would not belong, accordingly, to the earliest stage of Buddhism, nor is it found in the oldest Buddhistic works of the north of India or of Ceylon. Its original sense is rather obscure. Some suppose that it means O! (*om*), the jewel (*man'i*) in the lotus (*padme*), amen (*hūm*); "the jewel" being an allusion to the saint *Avalokites'wara* himself, and the word "*padme*, or in the lotus," is the belief that he was born from a lotus. It is probably, however, more correct to interpret the formula thus: "Salvation (*om*) [is] in the jewel-lotus (*man'i-padme*), amen (*hūm*);" when the compound word "jewel-lotus" would mean the saint and the flower whence he arose. If this interpretation be correct, the formula would be originally nothing more than a salutation addressed to *Avalokites'wara* or *Padmapān'i*; and the mystical interpretation put upon each syllable of it, would then be analogous to that which imparted a transcendental sense to each of the letters of the syllable *Om* (q. v.). Dr Emil Schlagintweit, in his valuable work on "Buddhism in Tibet" (Leipzig, 1863), relates (p. 120) that "in a prayer-cylinder which he had the opportunity of opening, he found the formula printed in six lines, and repeated innumerable times upon a leaf 49 feet long and 4 inches broad. When Baron Schilling de Canstadt paid a visit to the temple Sbulin, in Siberia, the Lamas were just occupied with preparing 100,000,000 of copies of this prayer to be put into a prayer-cylinder; his offer to have the necessary number executed at St Petersburg was most readily accepted, and he was presented, in return for the 150,000,000 of copies he forwarded to them, with an edition of the Kanjur, the sheets of which amount to about 40,000. When adorning the head of religious books, or when engraved upon the slabs resting on the prayer-walls, the letters of the formula are often so combined as to form an anagram. The longitudinal lines occurring in the letters "*man'i padme hūm*" are traced close to each other, and to the outer longitudinal line at the left are appended the curved lines. The letter "*om*" is replaced by a symbolical sign above the anagram, showing a half-moon surmounted by a disc indicating the sun, from which issues

a flame. Such a combination of the letters is called in Tibetan *nam chu sangdan*, "the ten entirely powerful (viz., characters, six of which are consonants, and four vowels);" and the power of this sacred sentence is supposed to be increased by its being written in this form. These kind of anagrams are always bordered by a pointed frame indicating the leaf of a fig-tree.—See also E. Burnouf, "Introduction à l'Histoire du Bouddhisme Indien" (Paris, 1844); C. F. Koepen, "Die Religion des Buddha" (Berlin, 1857—1859); and the works quoted by these authors.

OMA'GH (Irish, *Oigh magh*, "seat of the chiefs"), an ancient town, capital of the county of Tyrone in Ireland, situated on the river Strule, distant 84 miles south from Londonderry, and 110 miles north-north-west from Dublin, with both which cities it is connected by railway. O. grew up around an abbey founded in the year 792, but is first heard of as a fortress of Art O'Nial in the end of the 16th c., about which time it was forced to surrender to the English, although its possession long continued to alternate between Irish and English hands. It formed part of James I.'s "Plantation" grants, and was strongly garrisoned by Mountjoy. On its being evacuated by the troops of James II. in 1689, it was partially burned, and a second fire in 1743 completed its destruction. But it has been well re-built, and is now a neat and prosperous town. Pop. (1871) 3724. O. contains a very handsome court-house, where the assizes for County Tyrone are held, several neat churches (Roman Catholic, Episcopal, and Presbyterian), a convent, several partially endowed and national schools, a district lunatic asylum, and the workhouse of the Poor-Law Union of which it is the centre. There is also a barrack station—it being within the Belfast military district. Its trade is chiefly in brown linens, corn, and agricultural produce.

OMAHA CITY, the chief city of the state of Nebraska, U. S., is on the right bank of the Missouri, opposite Council Bluffs, and 20 miles north of the mouth of the Nebraska River. Besides the government offices, it has a large trade by the rivers, and across the prairies, and is the eastern terminus of the Union Pacific Railway, and also of the Omaha and North-western, and the Omaha and South-western lines. Pop. in 1860, 1912; in 1870, 16,083; in 1880, 30,518.

OMA'N, the most eastern portion of Arabia, a strip of maritime territory, extending between Ras-el-Jibonl and Ras-el-Had, bounded on the north-east by the Gulf of Oman, and on the south-west by the deserts of the interior. It is about 370 miles in length; its greatest breadth is 120 miles. At a distance of from 20 to 40 miles from the coast, a chain of mountains runs parallel to it, which reaches in its highest ridge, called *Gebel Achdar* ("Great Mountain"), an elevation of 6000 feet; the average height is 4000 feet. There are a few not inconsiderable streams, and some richly fertile tracts in this region, but the greater part is a waste of sand, with here and there a small oasis, where, however, the vegetation is most luxuriant. Groves of almond, fig, and walnut-trees, tower to an enormous height, overshadowing the orange and citron trees, but are themselves overtopped by the splendid date-palms. The most powerful state of O. is *Muscat* (q. v.).

OMAR, Abû-Hafsa-ibn-al-Khethab, the second calif of the Moslems, was born about 581. His early history is little known, but previous to his conversion he was an ardent persecutor of Mohammed and his followers. After his conversion he became as zealous an apostle as he had formerly been a persecutor, and rendered valuable aid to the prophet in all his warlike expeditions. After Mohammed's death, he caused Abû-bekr to be proclaimed calif, and was himself appointed *haujeb*, or prime-minister. Though of a fiery and enthusiastic temperament, he proved a sagacious adviser, and it was at his suggestion that the calif put down with an iron hand the many dissensions which had arisen among the Arabs after the prophet's decease, and resolved to strengthen and consolidate their new-born national spirit, as well as propagate the doctrines of Islam, by engaging them in continual aggressive wars. On the death of Abû-bekr, O. succeeded as calif, and pushed on the wars of conquest with increased vigor. He was summoned to Jerusalem in 637, to receive the keys of that city, and before leaving gave orders to build a mosque, now called by his name, on the site of the temple of Solomon. O. now took the command of a portion of the army, and reduced the other chief cities of Palestine. He then planned an invasion of Persia, which

Omar  
O'Meara

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was commenced the same year, and by 643 the whole of what is now known as Persia was subdued. In the meantime the war in Syria was vigorously prosecuted, and the Byzantine armies, repeatedly defeated, at length gave up the contest. In 639, Amrû, one of his generals, had invaded Egypt with a considerable force; but such was the prestige of the Arabs, or the incapacity of the lieutenants of the Emperor Heraclius, that this valuable country, with its six millions of people, was reduced under the calif's authority without a single contest, and only two towns, Misr and Alexandria, were even attempted to be defended. (For the story which was till lately believed concerning the destruction of the Alexandrian Library, see ALEXANDRIAN LIBRARY.) Barca and Tripoli were next subdued by Amrû. On the north, Armenia was overrun in 641, and the calif's authority now reached from the Desert of Khiva to the Syrtis, an enormous extension in ten years. In 644 O. was assassinated in the mosque of Medina by a Persian slave from motives of revenge. He languished five days after receiving the wound, but refused to appoint a successor, and named six commissioners who were to choose one for themselves. He was buried in the mosque of Medina, near the prophet and Abu-bekr, and his tomb is still visited by pilgrims.

O. may be called the founder of the Mohammedan power, as from a mere sect he raised it to the rank of a conquering nation, and left to his successor an empire which Alexander the Great might have envied. In him we find a rare combination of qualities, the ardent zeal of the apostle side by side with the cautious foresight and calm resolution of the monarch. His great military talents, and severity to "obstinate unbelievers," rendered him formidable to his enemies, and his inexorable justice rendered him no less obnoxious to the more powerful of his subjects, and gave rise to many attempts at his assassination. O. was the founder of many excellent institutions; he assigned a regular pay to his soldiers, established a night-police in towns, and made some excellent regulations for the more lenient treatment of slaves. He also originated the practice of dating from the era of the *Hedjrah* (q. v.). He assumed the title of *Emir-al-mumenin* ("Commander of the Faithful") in preference to that of *Khalifah-rasouli-Ilahi*, the ordinary designation; and to the present day his name is held in the greatest veneration by the orthodox or Suni sect of Moslems.

OMAR PASHA, a celebrated Turkish general, was born at Plaski, an Austrian village in the Croatian Military Frontier, in 1806 (according to some authorities, in 1811). His real name was Mikail Lattas, and his father being an officer in the Austrian army, Mikail was educated at the military school of Thurn, near Carlsbad, where he greatly distinguished himself. He afterwards joined one of the frontier regiments as a cadet, and was employed as secretary by the military inspector of roads and bridges; but having by some breach of discipline rendered himself amenable to punishment, he fled to Bosnia, where he became book-keeper to a Turkish merchant, and embraced Mohammedanism. He was next employed by Hussein Pasha, the governor of Widin, as tutor to his sons; and in 1834 was sent in charge of them to Constantinople, where his beautiful calligraphy gained for him the post of writing-master in the military school. Omar Effendi (as he was now called) was next appointed writing-master to Abdul-Medjid, the heir to the throne, and received the honorary rank of captain in the Turkish army, and the hand of a rich heiress. On his pupil's accession in 1839, O. was raised to the rank of colonel, and sent to Syria to aid in the suppression of disturbances which had broken out in that province, and in 1843 he was appointed military governor of the Lebanon district. The severity of his rule did not hinder the Maronites from desiring to have him as chief of the Mountain; but in the following year he was recalled, received the title of pasha, and was sent, along with Redschid Pasha, against the revolted Albanians. The skill and energy with which he suppressed this insurrection, as well as others in Bosnia and Kurdistan, raised him high in favor with the sultan. Towards the end of 1852 he opened the campaign against the Montenegrians, who were being rapidly subdued, when Austria interfered and compelled a treaty. On the invasion of the Principalities by the Russians (July 1853), O. collected at Schumla an army of 60,000 men to cover Constantinople; but being no less a politician than a soldier, he soon divined that the Russians would not immediately cross the Danube, and accordingly pushed on to Widin, where he crossed the river in presence of the enemy and intrenched himself at Kalufat. Another part of the Turkish army

moved down the Danube to Turtukal, near Silistria, crossed the river at that place, and intrenched themselves at Oltenitza. On November 4, the latter division were attacked by 9000 Russians, whom they totally defeated with a loss of nearly 4000 men and almost all their officers. The Russians also received two severe checks at Kalafat, on January 6 and March 15, 1855. O. kept up the spirit of his troops by occasional successful skirmishes with the Russians, and threw a garrison of 8000 men into Silistria. In the following spring the Russians passed the Danube at two points, and laid siege to Silistria (q. v.), but their assaults were invariably repulsed with severe loss. The Russians then withdrew from the Principalities, and O. entered Bucharest in triumph in August 1854. On 9th February 1855, he embarked for Eupatoria, where, on the 17th of the same month, he was suddenly attacked by 40,000 Russians, who were repulsed with great loss. He was soon afterwards (October 3, 1855) sent to relieve Kars, but arrived too late, and the armistice which followed (February 29, 1856) put a stop to his military career. He was subsequently made governor of Bagdad; but having been accused of maladministration, was banished to Knarport in 1859. He was recalled in the following year, and in September 1861 was sent to pacify Bosnia and Herzegovina, which were again in insurrection. This being accomplished, he attacked the Montenegrins, captured their chief town of Cetinji, and overran the country in 1862. O. held the Grand-cross of the Legion of Honor, and was a Knight of the Russian Order of St Anne. He ceased to take part in public life in 1869, being thereafter regarded as a minister without portfolio; and died in 1871.

OMBAY, or Maloewa (Malawa), an island between Celebes and the north-west coast of Australia, lies to the north of Timor, from which it is separated by the Strait of Ombay, lat. 8° 8'—8° 28' s., long. 124° 17'—125° 7' e. Area, 961 square miles. The population amounts to about 193,800. The hills of O. are volcanic, and the coasts steep and difficult to approach. The inhabitants are dark brown, have thick lips, flat nose, and woolly hair; appearing to be of mixed Negro and Malay origin. They are armed with the bow, spear, and creese, and live on the produce of the chase, with fish, cocoa-nuts, rice, and honey. A portion of the island formerly belonged to the Portuguese, but since August 6, 1861, it is entirely a Netherlands possession. The Dutch postholder resides at the village of Alor, to which iron wares, cotton goods, &c., are brought from Timor, and exchanged for wax, edible nests, provisions, and other native products. O. has oxen, swine, goats, &c., and produces maize, cotton, and pepper. Amber is also found, and the Boeginese of Celebes import European and Indian fabrics, exchanging them for the produce of the island, which they carry to Singapore.

O'MEARA, Barry Edward, was born in Ireland in the year 1786. Otherwise without claim to be remembered, his name remains notable from his connection with the first Napoleon, whom he accompanied to St Helena as household physician. At the age of 18 he entered the British army as assistant-surgeon. In 1808, being stationed at Messina, he became concerned in a duel as second, under circumstances which must more or less have been held discreditable, as his dismissal from the service by sentence of court-martial was the result. Afterwards he succeeded in procuring an appointment as surgeon in the navy, and as such for some years is certified to have discharged his duties with zeal and efficiency. As it chanced, he was serving with Captain Maitland in the *Bellerophon* when the Emperor Napoleon (q. v.) surrendered himself to that officer. During the voyage from Rochefort to Plymouth he was introduced to Napoleon, on whom the impression he produced was favorable, leading to a proposal that he should accompany the emperor into exile as private physician, an arrangement to which he acceded, stipulating that he should retain his rank in the navy, and be permitted to return to it at pleasure. By Napoleon, with whom he remained in daily intercourse at St Helena for about three years, he seems to have been admitted to something more or less like intimacy; and occasionally it might well be, as he says, that the great captive would kill the creeping hours by loose talk with his attendant over the events of his strange life. Of these conversations O'M. naturally enough took notes, which he afterwards published. Meantime he became involved in the interest of Napoleon, in the series of miserable and petty squabbles which he waged with the governor, Sir Hudson Lowe (q. v.). The result of these, as regards O'M., was that in 1818, after a violent altercation with Sir Hudson, he was committed to close arrest, and was authorised by the emperor to

resign his post. On his return to England, he addressed a letter to the Admiralty, in which, among other things, he accused Sir Hudson Lowe of intentions against the life of his captive, and even of having, by dark hints to himself, insinuated a desire for his services as secret assassin. For this he was instantly dismissed the service. The accusation was plainly monstrous and incredible. In 1822, after Napoleon's death, O'M. published "*Napoleon in Exile*," by which book alone he is now remembered. As conveying to the world the first authentic details of the prison-life of the great deceased, it made on its appearance an immense sensation, and—though for obvious reasons everywhere to be accepted, if at all, with caution—it is still not utterly without interest. The last years of O'M.'s life were passed in obscurity in the neighborhood of London, where, in 1836, he died.

**O'MELET**, or Omelette, French, a dish chiefly composed of eggs. These are broken, and their contents put into a proper vessel, in which they are whipped into a froth, which is poured into a very clean and dry frying-pan, with the addition of lard or butter to prevent sticking, and then fried carefully, so that the outside is nicely browned. Before frying, one of a number of ingredients may be added to vary the omelette, such as chopped savory herbs, minced ham or bacon, salt-fish, shell-fish, game, &c. Or sweet omelettes may be made by placing preserved fruits upon them when quite or nearly cooked. The omelette is an excellent dish, and, simple though it be, it requires much skill to prepare it successfully.

**O'MEN** (for the deriv., see **OM**), or Prodigy (generally said to be from *pro* and *disco*, but more probably from *pro* and *ago*, to lead; hence anything conspicuous, or extraordinary), the name given by the Romans to signs by which approaching good or bad fortune was supposed to be indicated. The terms *Omen* and *Prodigy* were not, however, exactly synonymous; the former being applied rather to signs received by the ear, and particularly to spoken words; the latter to phenomena and occurrences, such as monstrous births, the appearance of snakes, locusts, &c., the striking of the foot against a stone or the like, the breaking of a rhoea tie, and even sneezing, &c. If an omen or prodigy was promised on the part of a god, it was to be interpreted according to the promise; but otherwise, the interpretation was extremely arbitrary. It was supposed that evil indicated as approaching might be averted by various means, as by sacrifices, or by the utterance of certain magic formulas; or by an extempore felicity of interpretation, as when Cæsar, having fallen to the ground on landing in Africa, exclaimed: "I take possession of thee, Africa." Occasionally, it is true, we read of a reckless disregard of omens; as, for example, when P. Claudius, in the First Punic War, caused the sacred chickens, who would not leave their cage, to be pitched into the sea, saying: "If they won't eat, they must drink." Still the belief in them was universal, and in general the greatest care was taken to avoid unfavorable omens. The heads of the sacrificial priests were covered, so that nothing distracting might catch their eyes; silence was enjoined at the commencement of every sacred undertaking, and at the opening of the *Ludi*. Before every sacrificial procession ran the heralds, calling on the people to "pay respect to it," and admonishing them to cease working until it should have passed, that the priests might not hear unfavorable sounds. At the beginning of a sacrifice, the bystanders were addressed in the words *Facite Linguas* ("Speak no word of evil import"), and the aid of music was sought to drown whatever noises might prove unpropitious. Compare AUGURS and AUSPICES, and DIVINATION. See also FALLACI, "Ueber Begriff und Wesen des Rom. Omen" (Tüb. 1836).

The belief in omens has existed in all ages and countries, and traces of it linger even yet in the most civilised communities; in the dread, for instance, that many entertain at sitting down to table in a party of thirteen. Not a little of the philosophy of omens is contained in the Scottish proverb: "Them who follow freits, freits follow;" meaning, that a fatalistic belief in impending evil paralyzes the endeavor that might prevent it.

**OME'NTUM.** See **PERITONEUM**.

**OMMI'ADRS** (Omalades, or Ommeyades), a dynasty (deriving its name from an ancestor, Ommeyah) which succeeded to the Arabian califate on the death of Alî, the fourth calif after Mohammed; and possessed it till superseded by the Abbasides (q. v.) in 750. Moawiyah, the founder of the dynasty, was the son of Abu-Sofian,

who defeated Mohammed at Beder, and his mother was the notorious Hinda. After the death of Othman, the third calif, Moawiyah, who was his cousin, claimed the throne, and during the whole of Ali's reign, ruled over the western provinces of Syria and Egypt; but it was not till the death of that calif, and the abdication of his son Hassan in 661, that MOAWIYAH's authority was fully recognised. In that year he transferred the seat of the califate to Damascus; Kufa having been the residence of Ali, and Medina of the first three califs. The Arabs continued to extend their conquests during his reign; The Turks in Khorassan were subdued. Turkæstan invaded, and several important acquisitions made in Asia Minor. But besides aggrandising his empire, the calif neglected no means of consolidating it, and partly for this reason he made the succession hereditary, and caused his son YEZID (680-683) to be recognised as his heir. The reigns of Yezid and his successors, MOAWIYAH II. (683) and MERWÂN I., formerly the traitorous secretary of the calif Othman (683-685), are devoid of importance, as their sway extended only over Syria and Palestine. ABDULMELEK (685-705), an able and warlike prince, after a long and varying struggle of eight years, succeeded in rendering himself undisputed ruler of the Mohammedan world (692), but the latter part of his reign was much disturbed by rebellions in the eastern provinces. He was the first calif who interested himself in the promotion of liberal knowledge, by causing the most celebrated poetical and other works of the Persians to be translated into Arabic; and under his reign coined money was first introduced. It was to this prince that his court-fool related the celebrated fabulous conversation between the owl of Bassora and that of Mosul. Four of his sons, WALID I. (705-716), SULIMAN (716-717), YEZID II. (720-723), and HESHÂM (723-742), successively occupied the throne, and a fifth son, Mosslemah, was, from his great military abilities and zealous devotion to the interests of his brothers, the terror of all their enemies, both domestic and foreign. Under Walid, the Omniade califate reached the summit of its power and grandeur; Northern Africa (709) and Spain (712), Turkestan (707), and Galatia (710) were conquered; while towards the close of his reign, his empire was extended even to the Indus. The slender structure of the minaret was now for the first time introduced into mosque architecture. OMAR II. (717-720), who, in the justice and mildness of his government, surpassed the whole of the race of Ommeyyah, was appointed to succeed Suliman; but having excited discontent among his relatives, by suppressing the formula of malediction, which had hitherto been regularly pronounced at all public ceremonies against Ali and his descendants, he was poisoned. During his reign, Mosslemah had completed the conquest of Asia Minor, and even compelled the Emperor Leo to submit to the humiliation of walking beside his horse through the principal streets of Constantinople itself, and paying a large ransom (equivalent to about £140,000) for his capital. Heshâm, though like his immediate predecessor, fond of pleasure, possessed all the qualities necessary for a sovereign. The Greeks, who still strove for the possession of Asia Minor, were repeatedly defeated; the fierce Turks of Northern Persia and Turkestan, were kept in stern subjection; and the civil affairs of the empire carefully and strictly administered. The death of Mosslemah, the champion of the Omniade dynasty, seems to have been the signal for insurrection; the descendants of Ali raised the standard of revolt, and no sooner were they subdued than Ibrahim, the fourth in direct descent from Abbas the uncle of Mohammed, solemnly invested the celebrated Abu-Mosslem (stated to be a descendant of Koderz, one of the most distinguished heroes of Firdusi's admired work the "Shah-nameh") with the arduous duty of enforcing his long-agitated claims to the throne. During this reign the progress of Arab conquest in Western Europe was checked by Charles Martel, who inflicted upon the Arabs a severe defeat at Tours (732), and almost annihilated their army at Narbonne (736). The reigns of WALID II. (742-748), YEZID III. (748-744), and ISRAHIM (744), though of ephemeral duration, were long enough to produce a complete disorganisation of the empire; and though MERWÂN II. (744-750), the next and last calif of the house of Ommeyyah, was both an able and politic ruler, and a skilful warrior, the declining fortune of his family was beyond remedy. Abu-Mosslem, who had published the claims of the Abbasides amidst the ruins of Meru in 747, took the field at the head of a small but zealous band, and carried the black flag of the Abbasides from victory to victory, till before the close of the following year the whole of Khorassan acknowledged his authority. Irak was subdued in 749;



and though Ibrahim the Abbaside claimant was seized by Merwān, and executed in the same year, his brother Abul-Abbas succeeded to his claims, and the unfortunate calif, defeated in two engagements, fled to Egypt (750), whither he was pursued and slain. Abdallah, the uncle of the successful claimant, treacherously invited the remaining members of the house of Ommeiyah to a conference, and ordered a general massacre of them. Two only escaped: the one to the south-east of Arabia, where he was recognised as calif, and his descendants reigned till the 16th century; the other, Abderrahman, to Spain, where he founded the califate of Cordova.

**OMMIADÆ OF SPAIN.**—**ABDERRAHMAN I.** (755—787), on accepting the Spanish throne which was offered him by the Arab chiefs, assumed the titles of *Calif* and *Emir-al-mumenin*, and in spite of numerous revolts, strengthened and extended his power in Spain, till, with the exception of Asturias and the country north of the Ebro, his authority was everywhere acknowledged. His defeat of Charlemagne at Roncesvalles (q. v.) is too widely known to require further notice. He divided his kingdom into six provinces, whose rulers, with the *walis* of the twelve principal towns, formed a sort of national diet. His successors, **HESHAM I.** (787—796) and **AL-HAKEM I.** (796—821), were much troubled with internal revolts, under cover of which the Christians in the north-east established the state known as the "Spanish March." **ABDERRAHMAN II.** (821—852) re-established internal quiet, and occupied his subjects with incessant wars against the Christians. These conflicts developed among the Arabs that chivalrous heroism which is found nowhere else in the Mohammedan world. Abderrahman, himself a man of learning, greatly encouraged the arts and sciences, and diffused information among his people; he also attempted, by regulating the laws of succession to property, to constitute his kingdom on a basis analogous to that of other European nations. During his reign Mohammed Spain was the best governed country in Europe. His successors, **MOHAMMED I.** (852—880), **MONDHAR** (880—882), and **ABDALLAH** (882—912), followed in his footsteps. **ABDERRAHMAN III.** (912—961), after suppressing some dangerous revolts which had gathered head during his minority, conquered the kingdom of Fez from the Edrisites, and brought a long and exhausting war with the powers of Asturias and Leon to a victorious conclusion. This period is justly termed the golden age of the Arab domination in Spain, for at no period was their power so consolidated, and their prosperity so flourishing. Abderrahman, like his predecessors, was a great encourager of learning, and a poet of no mean ability. He founded schools which far surpassed those in other parts of Europe. His son, **AL-HAKEM II.** (961—976), was in every way worthy to be his successor, but his premature death was the cause of the downfall of the Ommiades in Spain. **HESHAM II.** (976—about 1018), a child of eight years, now occupied the throne; but fortunately his mother, Sobelha, possessed the abilities necessary for such an emergency, and appointed as her son's vizier Mohammed ben Abdallah, surnamed Al-Mansor, who had originally been a peasant. This remarkable man gained the affections of all ranks by his pleasing manners and great abilities; his administration was equally just and judicious, and his encouragement of literature, science, and art alike liberal and discriminating. But it is as a warrior that he is chiefly remembered; he had avowed eternal enmity to the Christians, and in all his numerous expeditions fortune seemed chained to his standard. The lost provinces were recovered; Castile, Leon, and Barcelona were conquered; and Navarre was on the point of sharing the same fate, when a rebellion in Fez compelled him to detach a portion of his force for service in Africa, and the combined armies of the four Christian monarchies, seizing this opportunity, inflicted upon the Arabs a sanguinary defeat in 1001. Mohammed's spirit was completely broken by this blow, and he died a few days afterwards. With him the star of the house of Ommeiyah set for ever. The rest of Hesham's reign was a scene of disorder and civil war. Pretenders to the califate arose, while the "walis" of the various provinces set up as independent rulers, and the invasions of the Christians added to the confusion. Hesham finally resigned the throne about 1013; and, with the exception of the brief reign of **HESHAM III.** (1027—1031), from this time the family of Ommeiyah, which had for more than two centuries so happily and brilliantly governed the greater part of Spain, disappears from history. One remarkable feature of their rule deserves mention, as it contrasts them so favorably with the contemporary and subsequent rulers

of Spain, even to the present time, and that is their universal toleration in religious matters.

**O'MNIBUS** (Lat. *omnibus*, "for all"), familiarly contracted into "bus," is the largest kind of public street conveyance, and is appointed to travel between two fixed stations, starting at certain fixed hours, and taking up or setting down passengers at any point in its route. Vehicles of this sort were first started in Paris in 1662, when it was decreed, by a royal edict of Louis XIV., that a line of *carrosses à cinq sous* ("twopence-halfpenny omnibuses"), each containing eight places, should be established for the benefit of the infirm, or those who, requiring speedy conveyance from one part of the town to another, were unable to afford a hired carriage for themselves; these "*carrosses*" were bound to run at fixed hours from one station to another, whether full or empty. The public inauguration of the new conveyances took place March 18, 1662, and was the occasion of a grand fête; and the novelty took so well with the Parisians, that the omnibuses were for some time monopolised by the wealthier classes. However, when the rage for them died away, it was found that those for whose special benefit they were instituted made no use of them, and they, in consequence, gradually disappeared. The omnibus was not revived in Paris till 1827, when it was started in its present form, carrying from 15 to 18 passengers inside, with only the driver above and the conductor behind; and on July 4, 1829, they were introduced into London by a Mr Shillibeer. Shillibeer's conveyances, which for some time afterwards were known as *shillibeers* (an epithet still in common use in New York), were of larger size than the French ones, carrying 22 passengers inside, and were drawn by three horses abreast. The omnibus was introduced into Amsterdam in 1839, and since that time its use has been extended to all large cities and towns in the civilised world. The seats of the omnibus are generally placed lengthwise, and the door behind. The omnibus is managed by a driver and a conductor. In New York, omnibuses are drawn on street-railways; and this practice is now being extensively employed in the chief towns of Great Britain, where the omnibuses are called tramway cars, and the railway a tramway.

**O'MNIUM**, a term used at the Stock Exchange to express the aggregate value of the different stocks in which a loan is funded. See McCulloch's "Dictionary of Commerce."

**OMSK**, a town of the Russian province of Central Asia, in the government of Akmoinsk, stands at the confluence of the Om—a river upwards of 200 miles in length—with the Irtysh; 2225 miles from St Petersburg. Lat. 54° 59' N., long. 73° 20' E. It was built in 1716, as a defence against the Khlirghiz; but is now of no importance as a fortress. It was till a recent date the centre of government for Western Siberia, the centre of the administration of the Siberian Khlirghiz, the seat of the courts of justice, and of the Siberian corps of cadets. It contains manufactories and mining works. Hitherto its commerce has been limited to a trade with the Khlirghiz, who drive up their cattle to this place; but its advantageous position on the great post-road and commercial line of traffic from Europe across the whole of Siberia to the Chinese frontier, makes it probable that it will some day become an intermediate station for extensive commercial exchanges. Pop. (1867) 26,722.

**OMUL** (*Salmo migratorius*), a fish of the salmon and trout tribe, abounding in Lake Baikal and other waters of the east of Siberia, from which great quantities are sent salted to all the western parts of that country. In size it is rarely more than 15 or 16 inches long. Its flesh is very white and tender. It ascends rivers in shoals for the purpose of spawning.

**O'NAGER**. See Ass.

**ONAGER**. See BALISTA.

**ONAGRACEÆ**, Onagraceæ, or *Enotheraceæ*, a natural order of exogenous plants, consisting chiefly of herbaceous plants, but including also a few shrubs; with simple leaves; axillary or terminal flowers; the calyx superior, tubular, sometimes colored, its limb usually 4-lobed; the petals inserted into the throat of the calyx, generally equal in number to its segments; the stamens generally four or eight, rarely one or two, inserted along with the petals; the ovary generally 4-celled, sometimes 2-celled; the style threadlike, the fruit a capsule or a berry. There are about

Oncocarpus  
Onomacritus

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450 known species, natives chiefly of temperate climates, among which are some much cultivated for the beauty of their flowers, particularly those of the genera *Fuchsia*, *Oenothera* (Evening Primrose), *Clarkia*, and *Godetia*. The British genera are *Mytilobium* (Willow herb) and *Circeea* (Eucharis's Nightshade). A few species produce edible berries, and the roots of one or two are eatable; but none are of economical importance. The root of *Isarida alternifolia*, found in the marshes of Carolina, and called *Bowman's Root*, is emetic. Some species of *Jussiaea* are used in dyeing in Brazil.

**ONCOCARPUS**, a genus of trees of the natural order *Anacardiaceæ*. One of the most remarkable trees of the Fiji Islands is *O. atra*, or *O. vitiensis*, a tree about sixty feet high, with large oblong leaves and a corky fruit, somewhat resembling the seed of a walnut; the sap of which, if it comes into contact with the skin, produces a pain like that caused by red-hot iron. The wood is often called Itch-wood, because of the effect produced on persons who ignorantly or incautiously bark it whilst the sap is fresh, even the exhalations causing an intolerable itching and innumerable pustules, with excessive irritation for several days, whilst the effects continue to be unpleasantly felt even for months.

**ONEGA**, a small town and seaport in the north of Russia, in the government of Archangel, and 90 miles south-west of the city of that name. It stands at the mouth of a river, and on the shore of a gulf of the same name; the latter a branch of the White Sea. Lat. 63° 54' n., long. 83° 7' e. Pop. (1867) 2208, employed in connection with the saw-mills of the "Onega Trading Wood Company." In these mills, where numerous men are at work, an English steam-engine has been erected. About 50 ships leave the port annually for England, with cargoes of deals and timber to the value of £37,000.

**ONEGA**, Lake, an extensive lake in the north of Russia, government of Olonetz, and, after Ladoga, the largest lake in Europe, is 59 miles in greatest breadth, and about 150 miles in length. Area, 8720 square miles. It is fed by numerous rivers, and receives through the river Valla the waters of the lake of that name. Its only outlet is the river Swir, which flows south-west into Lake Ladoga. By means of the Marinsky system of communication, Lake O. communicates with the Volga, and thence with the Caspian Sea on the south, and with the Dwina, and thence with the White Sea on the north. The clear and beautiful waters of this lake are rich in fish, and embrace many islands. The depth ranges from 550 to 700 feet. The navigation of the lake is dangerous, and commerce is chiefly confined to the Onega Canal, which extends from the town of Vytegra on the river of that name to the river Swir.

**ONEGLIA**, a town of North Italy, in the province of Porto' Manrizio, on the Gulf of Genoa, 40 miles east-north-east from Nice at the mouth of the Impera, a small river which rushes down from the Apennines. The harbor is not good. The principal article of export is oil. Andrea Doria, the great Genoese admiral, was born here. Pop. about 8000.

**O'NEROUS CAUSE**, in Scotch Law, means a pecuniary or valuable consideration.

**O'NION** (Fr. *oignon*, from Lat. *unio*, a pearl, but found in Columella, signifying a kind of onion), the name given to a few species of the genus *Allium* (q. v.), and particularly to *A. cepa* (Lat. *cepa*), a biennial bulbous-rooted plant, with a swelling stem, leafy at the base, tapering fistular leaves, a reflexed spathe, a large globose umbel, usually not bulbiferous, the lobes of the perianth obtuse and hooded, not half as long as the stamens. The bulb is simple—not composed of cloves, like that of garlic; and in the common variety is solitary, shewing little tendency to produce lateral bulbs. The native country of the O. is not certainly known, some supposing it to be India and some Egypt, in both of which it has been cultivated from the most remote antiquity. The part chiefly used is the bulb, but the young leaves are also used, and young seedlings drawn from onion beds are a very common ingredient in soups and sauces in the beginning of summer. These are known in Scotland as *scabbies* (evidently another form of the word *Cibol*). In warmer climates, the O. produces a larger bulb, and generally of more delicate flavor, than in Britain; and is more extensively used as an article of food, being with us, whether fresh or pickled, gener-

ally rather a condiment. In Spain and Portugal, a raw O. is often eaten like an apple, and often with a piece of bread forms the dinner of a workman. The O. is, however, very nutritious. It contains a large quantity of nitrogenous matter, and of uncrystallisable sugar; with an acrid volatile sulphurous oil, resembling oil of garlic. The oil of the O. is dissipated by boiling, so that boiled onions are much milder than raw onions. In Britain, onions are sown either in spring or in August. Great fields of them, as of other favorite vegetables, are cultivated for the London market; and large quantities of onions are also imported from more southern regions. The Bermudas are celebrated for their onions. The O. loves a rich light soil and a dry subsoil. The transplanting of onions is often practised, especially of onions sown in autumn, which are transplanted in spring, and when these are placed so that the small bulbs are on the surface of the ground, and surrounded with decayed manure, very large bulbs are obtained. The frequent stirring of the soil is of great advantage. The bulbs are taken up when the leaves decay, and after being dried in the open air or in a loft, may be kept for a considerable time.—The **POTATO O.**, also called the **EGYPTIAN** or **GROUND O.**, is a perennial variety which produces offset bulbs at the root, like the shallot; but the bulbs are much larger than those of the shallot, and have less of the flavor of garlic, although stronger than those of the common onion. It is sometimes said to have been introduced into Britain from Egypt by the British army in 1505, but erroneously, as it was cultivated in some parts of Britain long before. It is in very general cultivation among the peasantry in some parts of Scotland.—The **PEARL O.** is a similar variety, with much smaller bulbs.—The **TREE O.** is also generally regarded as a variety of the common onion. It produces bulbs at the top of the stem, the umbels becoming viviparous.—Onions are similar to Garlic (q. v.) in medicinal properties, but milder. As a condiment or article of food, they agree well with some stomachs and stimulate digestion, but are intolerable to others. Roasted onions with oil make a useful emollient and stimulating poultice for suppurating tumors. The use of onions stimulates the secreting organs.—The **CIBOL** or **WELSH O.** (*A. fistulosum*), a native of Siberia, cultivated in Britain, but more generally in Germany, has a perennial fibrous root, with no bulb, very fistular leaves, and a 3-cornered ovary. It is useful as supplying tender green leaves for culinary use in the beginning of spring, like the chive, and somewhat earlier in the season. It is much larger than the chive, but its use is similar.

**ONISCUS.** See **WOODLOUSE**.

**O'NKELOS**, the supposed author of an Aramaic version (Targum) of the Pentateuch. The name seems a corruption from that of Akilas, one of the Greek translators of the Old Testament (see **VERSIONS**). The translation, said to be by O., is, in its present shape at least, probably the work of the Babylonian, schools of the 3d and 4th centuries A.D. At first orally transmitted, various portions of it began to be collected and written down in the 2d c., and were finally redacted about the time mentioned. The history of the origin and growth of Aramaic versions in general will be treated under *Targum* (**VERSIONS**). The idiom of O. closely resembles that of Ezra and Daniel. The translation itself is executed in accordance with a sober and clear, though not a slavish exegesis, and keeps closely to its text in most instances. In some cases, however, where the meaning is not clear, it expands into a brief explanation or paraphrase, uniting the latter sometimes with Haggadic by-work, chosen with tact and taste, so as to please the people and not to offend the dignity of the subject. Not unfrequently it differs entirely from the original, as far, e.g., as anthropomorphisms and anthropopathies—anything, in fact, which might seem derogatory to the Deity—are concerned. Further may be noticed a repugnance to bring the Divine Being into too close contact, as it were, with man, by the interposition of a kind of spiritual barrier (the "Word," "Shechinah," "Glory") when a conversation, or the like, is reported between God and man. Its use lies partly in a linguistic, partly in a theological direction; but little has been done for its study as yet. Notwithstanding the numerous MSS. of it extant in almost all the larger libraries of Europe, and in spite of the grossly incorrect state of our current printed editions, no critical edition has ever been attempted.

**ONOBRYCHIS.** See **SAINTFOIN**.

**ONOMACRITUS**, a celebrated religious poet of ancient Greece, lived at Athens

Onomatopœia  
Onyx

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in the time of the Pelsistratida. He collected and expounded—according to Herodotus—the prophecies or oracles of Mœseus (q. v.), but is said to have been banished from the city by Hipparchus, about 516 B.C., on account of interpolating something of his own in these oracles. He then, we are told, followed the Pelsistratida into Persia, and while there was employed by them in a very dishonorable way. They got him to repeat to Xerxes all the ancient sayings that seemed to favor his meditated invasion of Greece. Some critics, among whom is Aristotle, have inferred from a passage in Pausanias that O. is the author of most of the so-called Orphic hymns. More certain, however, is the view which represents him as the inventor of the great Orphic myth of Dionysus Zagreus, and the founder of Orphic religious societies and theology. Pausanias states that "Onomacritus established orgies in honor of Dionysus, and in his poems represented the Titans as the authors of the sufferings of Dionysus." See Müller's "Geschichte der Griech. Literatur bis auf das Zeitalter Alexander's" (Breslau, 1841); Grote's "History of Greece," &c.

ONOMATOPŒIA, the Latin form of the Greek word *onomatopœia* means literally the making or invention of names, and is used in philology to denote the formation of words in imitation of natural sounds, as in *cuckoo*, Lat. *cucu* (Jus); *pee-wee*, Scan. *pee-weip*, Dutch, *kiewit*; *cock*; *clash*, *rap*, *tap*, *quack*, *rumble*, *whizz*, *clang*. Such words are sometimes called onomatopœias; more properly they are onomatopœian, or formed by onomatopœia.

In a more extended sense, the term is applied to the rhetorical artifice by which writers (chiefly poets) seek through the choice and arrangement of words to make the "sound" throughout whole phrases and sentences, "an echo to the sense," as in Homer's well-known *poluphloiboto thalasses*, expressive of the breaking of waves upon the seashore; or where Tennyson makes the sea

Roar rock-thwarted under bellowing caves.

The occurrence of so many obviously onomatopœian words in all known languages, suggests the question, whether the same principle may not have been concerned in producing the original germs or roots of the great bulk of words. There is little hope that the question will ever be conclusively settled either way; for the changes of time have made it, in most cases at least, impossible to say what the first form and signification of a root were; but the balance of arguments seems in favor of the affirmative answer. "The action of the mind," as it has been expressed, "produced language by a spontaneous repercussion of the impressions received." Now, the articulate sound first affixed in this way to an object or an action as its sign cannot be conceived as arbitrary; nor is there any mysterious and inherent correspondence between any one conception of the mind, and a particular articulate sound. The sound uttered must have been suggested by something connected with the object or action itself; and by what more naturally than by the inarticulate sound which the object or action itself emits?

The chief objection to this theory is, that if the first words were merely reproductions of natural sounds, the same natural objects would have had the same names all the world over. To which it is answered, that the mind in its first efforts at naming did not seek an exact reproduction of the sound, but a suggestive imitation; primitive words were not echoes, but "artistic representations." Now, the sounds of nature are not simple, but composite. Like other concrete phenomena, they present a variety of aspects; and according as one or another aspect seemed the most prominent to the observer, a different vocal sound would suggest itself as the appropriate symbol. Thus, when Professor Max Müller argues ("Science of Language," Lond. 1861) that if the "bow-wow" theory, as he nicknames it, were true, men would have everywhere spoken of a *moo*, as is done in the nursery, and not of a *cow*; it seems a valid answer to say, that the Indian *gu*, the Tent. *kuh* (Eng. *cow*), and the Græco-Lat. *bou*, are really as suggestive imitations of the animal's actual voice as *moo*. To take a more striking instance: few words differ more in sound and aspect than the Eng. *thunder* (Ger. *donner*, Lat. *tonitru*, Fr. *tonnère*) does from the Mexican name for the same thing, *tlatlalnitzel*, and yet it would be difficult to say which is the more suggestive of the natural sound.

It is no doubt true that the great bulk of names are derived from roots having a general predicative power; but this by no means excludes the principle of onomatopœia. Thus, to take one of the instances adduced by Professor Müller himself, the

of raven or crow (Sans. *kārava*, Lat. *corvus*, Gr. *korōnē*); this is derived from the root *ru* or *kru*, which means to cry or call, and the bird was called a *kārava*, or crow, not in imitation of his voice, but because he was "a shouter, a caller, a crier. The name might have been applied to many birds, but it became the traditional and recognised name of the crow." But how came the articulation *ru* or *kru* to be chosen to convey the general meaning of crying or calling; may we not suppose that it was suggested by the voice of birds of the crow kind, whose notes are most markedly cries or calls to their fellows, as distinguished from singing? Once adopted in this particular case, it would naturally be extended to any kind of cry or call, from the harshest to the softest.

**ONTARIO**, the easternmost and smallest of the five great lakes of North America, lies in 43° 10'—44° 8' n. lat., and 76° 30'—80° w. long. At its south-west corner it receives the waters of the upper lakes by the Niagara, and at its north-east corner it issues into the St Lawrence; which for some distance below is called the Lake of the Thousand Isles. Its surface, which varies a few feet with the seasons, is about 330 feet below that of Lake Erie and 234 feet above tide-water. Its bottom, therefore, must be considerably lower than the level of the Atlantic, as it is in some places 600 feet deep. It is 190 miles long, 55 in its widest part, and about 450 in circumference. Sufficiently deep throughout for vessels of the largest tonnage, it has many convenient and thriving ports, of which the chief are Kingston, Port Hope, Cobourg, Toronto, Hamilton, on the Canadian shore, and Oswego, Sackett's Harbor, Port Genesee in the United States. Its navigation has been facilitated by the erection of 15 light-houses on the American side, and 13 on the Canadian; while it is connected with Lake Erie by the Welland Canal, with the Erie Canal and New York by the Oswego Canal, and by the Rideau Canal with the Ottawa. Lake O. is subject to violent storms, and it is probably owing chiefly to the constant agitation of its waters that it freezes only for a few miles from the shore. The shores of Lake O. are generally very flat, but the Bay of Quinte, a long crooked arm of the lake, which stretches about 50 m., possesses some attractive scenery. Burlington Bay, on which Hamilton lies, is a large basin, almost inclosed by a natural, but strangely accumulated bank of sand, which forms a beautiful drive.

**ONTARIO**, the province. See **CANADA**.

**ONTENIENTE**, a town of Spain, in the province of Valencia, 45 miles south-by-west from Valencia, on the right bank of the Clariano, and near the railway which connects Valencia with Madrid. Linen and woollen fabrics are manufactured here; there are also numerous oil-mills. Pop. 9503.

**ONTOLOGY**. See **METAPHYSICS**.

**ONUS PROBANDI**, i.e., the burden of proof, is often a difficult question in litigation; but as a general rule, the plaintiff who institutes the suit is bound to give proof of the allegations on which he relies. There are many nice and technical rules on the subject, both in suits and actions, which are too minute to be here stated.

**O'NYX**, an agate formed of alternating white and black, or white and dark-brown stripes of chalcedony. More rarely, a third color of stripes occurs. The finest specimens are brought from India. O. is in much esteem for ornamental purposes. The ancients valued it very highly, and used it much for cameos. Many of the finest cameos in existence are of onyx. The name O., however, appears to have been applied by the ancients more extensively than it now is, and even to striped calcareous alabaster, such as is now called Onyx Marble. The *Sardonx* of the ancients is a variety of O., in which white stripes alternate with stripes of a dark-red variety of carnelian, called *sard* or *sarda*. It is one of the rarest and most beautiful kinds of O., and is more valued than carnelian.

**ONYX MARBLE**, a very beautiful material, which first came into general notice in this country in 1862, when the French made a large display of it in the International Exhibition. It is a stalagmitic formation, which was discovered by the French in making roads in the province of Oran in Algiers. It is a translucent limestone, containing traces of magnesia and carbonate of iron; its specific gravity is 2.730. The quarries are worked by a company, and the artistic workmen of

Oolite  
Oolite

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France are turning it to good account, in the manufacture of very beautiful ornamental works.

OOJET'N. See USEIN.

OOLITE (Gr. egg-stone), a variety of limestone, often very pure calcareous spar, distinguished by its peculiar structure, being composed of grains connected together by a calcareous cement; the whole much resembling the roe of a fish. The grains are not unfrequently hollow. Many oolites, as in the south of England, are excellent building-stones. There is no important mineralogical difference between O. and *Pisolite*, or *Pea-stone*. O., as a geological term, is extended far beyond its mineralogical and original signification.

OOLITE or Jurassic Group (in Geology), an extensive and important series of strata of Secondary age, underlying the Chalk formation, and resting on the Trias. In Britain they received the name Oolite, because in the district where they were first examined and described by Dr W. Smith, the limestones contained in them had an oolitic structure (see foregoing article). The name Jurassic has been given to them on the continent, because the range of the Jura Mountains in the north-west of Switzerland is almost entirely composed of them. The strata of the group have been arranged in the following order. The maximum thickness of each division is given in feet:

## UPPER OOLITE.

	Feet.
1. Purbeck Beds.....	200
2. Portland Beds.....	170
3. Kimmeridge Clay.....	600
	— 970

## MIDDLE OOLITE.

4. Coral Rag.....	190
5. Oxford Clay.....	600
	— 790

## LOWER OOLITE.

6. Cornbrash and Forest Marble.....	80
7. Great Oolite and Stonesfield Slate.....	150
8. Fuller's Earth.....	150
9. Inferior Oolite.....	250
	— 630

## LIAS.

10. Upper Lias.....	300
11. Marlstone.....	300
12. Lower Lias.....	600
	— 1100

Total..... 3490

It is apparent from this table that the Oolitic rocks consist of three extensive clay deposits, each of which forms the basis of a smaller and variable set of sands and limestones; the Upper Oolites resting on the Kimmeridge Clay, the Coral Rag on the Oxford Clay, and the Lower Oolite on the Lias.

1. The Purbeck beds, unlike the other oolitic rocks, are chiefly freshwater deposits. Though lithologically they are very similar throughout, the peculiarities of the contained fossils have caused them to be grouped into three series—the Upper, Middle, and Lower. The Upper Purbecks are purely freshwater, containing beds of limestone and shale, which abound in shells of lake and river molluscs and cyprides. The stone called Purbeck Marble, formerly so extensively used in the ornamental architecture of English churches and other buildings, belongs to this division; it consists of the shells of *Paludina*, held together by a somewhat argillaceous paste. The Middle Purbecks are partly freshwater, and partly brackish or marine. The “clunder-bed,” composed of a vast accumulation of shells of *Ostrea distorta*, occurs in this section, and near it is the narrow layer from which Mr

Beckles recently obtained the remains of several mammals. The Lower Purbocks are chiefly freshwater, with some intercalated brackish or marine beds, and one or two old vegetable soils called by the quarrymen "dirt-beds," which contain the stems of Cycadaceans and Coniferous plants. 2. The Portland beds consist of oolitic and other limestones interstratified with clays, and passing below into sands and sandstones, from which the well-known building-stone is obtained, of which St Paul's and many of the principal buildings in London are built. 3. The Kimmeridge Clay is generally a dark-gray bituminous shale, with intercalated beds of sand, calcareous grit, and layers of septaria. The dark shale in some places passes into an impure brown shaly coal. 4. The Coral Rag contains, as its name implies, an abundance of corals, in bluish limestone beds mixed with layers of calcareous grit. The Solenhofen lithographic stone, with its beautifully preserved and varied fossil remains, belongs to this division. 5. The Oxford Clay is a dark-blue or blackish clay without corals, but having a large number of beautifully preserved Ammonites and Belemnites. Beds of calcareous sandstone, called Kelloway Rock, occur in its lower portion. 6. The Cornbrash consists of thin beds of cream-colored limestone, with sandstones and clays, and the Forest Marble (so named from Wychwood Forest) is composed of an argillaceous limestone, with numerous marine fossils, blue marls and shales, and yellow silicious sand. At Bradford, Wiltshire, the Forest Marble is replaced by a considerable thickness of blue micaceous clay. 7. The great Oolite is composed of shelly limestones, sandstones, and shelly calcareous sandstones, and the Stonesfield Slate is a slightly oolitic shelly limestone, which splits into very thin slabs, erroneously called "slates;" it is remarkable for the remains of terrestrial reptiles and mammals found in it. The Bath Oolite, a celebrated building-stone, belongs to this division. 8. The Fuller's Earth group is a local deposit found near Bath; it consists of a series of blue and yellow shales and marls, some of which have properties fitting them for the use of the fuller. 9. The Inferior Oolite is composed of a series of beds of pisolitic and shelly limestones, brown marl, and brown sandy limestone, all abounding in fossils. 10. The Lias (q. v.) is a great clay deposit. It is divided into the Upper and Lower Lias, which consist of thin beds of limestone scattered through a great thickness of blue clay, and separating these two groups, the Marlstone, or calcareous or ferruginous sandstone. The Lias abounds in beautifully preserved fossils.

The oolite occupies, in England, a zone nearly thirty miles in breadth, extending across the country from Yorkshire to Dorsetshire. In Scotland, patches of lias and Oxford clay occur in the islands of Mull and Skye, and on the western shores of the mainland, and beds belonging to the lower oolite are found at Brora, on the east coast of Sutherland, which contain an impure coal. The only oolite rocks in Ireland are a few isolated patches in Antrim, which abound with the fossils of the lower lias. On the continent, rocks of this age occur in Germany and France, but they have been most extensively studied in the Jura Mountains, which, though having a height of 6000 feet, are entirely composed of oolite and cretaceous rocks. The strata are greatly bent and contorted, and as they approach the Swiss Alps, the great mass of which is also formed of oolite, they become completely metamorphosed into clay slates, mica schists, gneiss, and crystalline limestones. Beds of oolite have been noticed in Cutch, in India. In Australia similar beds occur on the western coast, and probably some of the coal-beds of New South Wales, Victoria, and Tasmania belong to the oolite. In both North and South America, fossils, apparently of oolitic age, have been found; but these deposits require to be more exactly examined.

The oolite is remarkable for the abundance of its fossils, and is in this respect in striking contrast to the immediately preceding Triassic and Permian periods. The several freshwater deposits, and the ancient vegetable surfaces, contain the remains of a considerable number of plants. Ferns still abound, and with them are associated species that are evidently related to the living genera *Cupressus*, *Araucaria* and *Zamia*.

Corals abound in several of the beds. The brachiopods are the only division of the mollusca that is not largely represented. The conchifers and gastropods shew a great number and variety of new genera, which are nearer the forms of the present day than those that preceded them. But the remarkable feature of molluscan life is the enormous development of the cephalopods. Whole beds are almost entirely made up of their shells. No less than 600 species of ammonites have been described, chiefly from the rocks of this period, and the belemnites were also very



Oomrawutti  
Open

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numerous. The crinoids have become scarce, but are replaced by star-fishes and sea-urchins. The freshwater beds contain the remains of many insect forms. The heterocercal-tailed fish give way to the more modern homocercals, and the true sharks and rays make their appearance, though the old cestracloids are still represented by some survivors. The characteristic feature of the oolitic period was its reptiles. The land, the sea, and the air had each their fitting inhabitants of this class. The various species of pterodactyles, some not larger than the bat, others surpassing, in the stretch of their membranous "wing," the size of the largest living bird, were the terrors of the air; while their allies, the monster ichthyosaurs and plesiosaurs, held the mastery of the waters; and the huge megalosaurs, some not less than 30 feet in length, trod the earth. The few mammalian remains hitherto found, have a special interest from their antiquity, being the first evidence of this high order of animals on the globe. They belong, apparently, to marsupial animals; one species is, however, supposed by Owen to have been a hoofed and herbivorous placental mammal.

**OOMRAWUTTI**, or Amrawati, an important commercial town of British India, in the province of Berar, 86 miles west-by-south from Nagpore, on one of the headwaters of the Purna, a branch of the Tapti. The district which contains it was ceded by the Nizam to the British government; and transit-duties, which formerly much interfered with the commerce of the town, have been abolished. Several considerable business firms are established here; and the chief merchants of Upper India and of Bombay have agents, who often make advances to the cotton cultivators of the surrounding country, on security of their crop. There are large cotton ware-houses at Oomrawutti. Pop. 23,410.

**OONALA'SKA**. See **UNALASHKA**.

**OORA'LSK**. See **URALSK**.

**OO'RFA**. See **URFA**.

**OO'RGÄ**. See **URGA**.

**OO'RI** or Limpopo River, an important river system of South-Eastern Africa, rising in lat. 26° s. in the high plateau called the Mughesberg, which bounds the basin of the Orange River to the north, and with its different branches, the Marqua, Ngotunne, Lipalula, &c., draining the regions now known as the Transvaal Republic. Flowing first to the north, the O. gradually turns to the east, and is supposed to reach the Indian Ocean at Imhambane. In lat. 24°, after a course of 960 miles, and draining a basin of not less than 250,000 square miles, yet, like other South African rivers, it is not navigable, and the very position of its embouchure is not yet very satisfactorily ascertained. The basin of this river occupies the depression which exists between the watershed of the Orange River on the south, and the south tributaries of the Zambezi on the north.

**OOROOME'YAH**, town and lake. See **URUMEYAH**.

**OO'STERHOUT**, a flourishing town in the Netherlands, province of North Brabant, six miles north-north-east from Breda, is situated in a well-wooded, fertile district of country. Pop. (1871) 8755, of whom 8425 belonged to the Roman Catholic Church. Much business is done in the grain and cattle markets. There are 14 tanyards, several flourishing beer-brewing establishments, 5 potteries, and 4 brick-works. O. has a grammar-school, and a nunnery, the inmates of which employ themselves in teaching the children of the poor. The handsome town-house and great Roman Catholic Church stand on the market-place, which is shaded with linden-trees.

Near O. is an extensive wood, where are the ruins of the house of Stryen or Oosterhout, formerly the residence of the Counts of Stryen, under whose jurisdiction were not only the town and barony of Breda, but also the marquisate of Bergen-op-Zoom.

**OOTACAMU'ND**, the chief town in the Neilgherry Hills, and the great sanatorium of Southern India. These hills are situated between 11°—12° n. lat., and 76°—77° e. long. The elevation of O. is 7400 feet above the sea; the mean temperature being about 49°, the maximum 77°, and the minimum 38°. The average rainfall is 45 inches. Its distance is only about 350 miles from Madras, and it is easy of access.

as the railway now conveys the traveller to the foot of the Hills. The other stations on the Neilgherries are Coonoor, Kottagherry, and Jackatala, or Wellington. In the last place, there is a fine range of barracks for European troops. The number of European settlers on these hills is increasing. There are thriving plantations of tea and coffee, and the cinchona or quinine plant. Pop. (1872) 9982.

OO'TRUM, an Indian fibre, derived from the stem of *Dorinia extensa*, a plant of the natural order *Anacardiaceæ*, abundant in many parts of Hindustan. The fibre is soft, white, silky, and strong, and is regarded as a promising substitute for flax.

O'PAH, or King-fish (*Lampris guttatus* or *L. luna*), a fish of the Dory (q. v.) family (*Zeidae*), occasionally found in the British seas, but more common in more northern regions, and found not only in the Atlantic and Arctic Oceans, but also in the Pacific, as on the coasts of China and Japan. It is of an oval form, greatly compressed, with small thin scales, the mouth small and destitute of teeth, a single dorsal fin much elevated in front and extending almost to the tail. This fish attains a large size, being sometimes five feet long and 150 pounds in weight. It is brilliantly colored; the upper part of the back and sides rich green, reflecting purple and gold in different lights, the lower parts yellowish-green, round yellowish-white spots above and below the lateral line; all the fins bright vermillion. The flesh is much esteemed; it is red like salmon, and is said to resemble it in flavor.

O'PAL, a mineral which differs from quartz in containing from 5 to 18 per cent. of water, its only other essential constituent being silica, although a little alumina, oxide of iron, &c., is often present. It is never found crystallised, and does not exhibit a crystalline structure like quartz. It has a conchoidal fracture, and is very easily broken. There are many varieties, which pass into one another, so that their precise limits cannot be defined, from which has arisen no little confusion of names. The finest kind is called *Precious O.* or *Noble O.*, and sometimes *Oriental Opal*. It is semitransparent or translucent, usually of a bluish or yellowish white color, yellow by transmitted light, and exhibits a beautiful play of brilliant colors, owing to minute fissures which refract the light. It is much valued for setting in rings, brooches, &c., and is polished with a convex surface, never cut into facets, both because of its brittleness, and because its play of colors is thus best exhibited. The ancients valued opals very highly. The Roman senator Nonius preferred exile to giving up an O. to Mark Antony. This O. was still to be seen in the days of Pliny, who ascribes to it a value equal to more than £100,000 sterling. The Imperial cabinet of Vienna contains the most celebrated O. now known to exist. It is five inches by two inches and a half. The finest opals are almost all brought from Kaschan in Hungary, where they are found disseminated in a trachytic conglomerate. They are mostly very small, but even a very small O., if really beautiful, is worth four or five pounds; and the price increases very rapidly with increase of size. Precious O. is found also in Saxony, in South America, &c. When the colors are not equally diffused, but in detached spots, jewellers call it *Harlequin Opal*. There is a dark or blackish variety, apparently tinged by oxide of iron, which occasionally exhibits very beautiful reflections, and is then much prized. *Girasol* (q. v.) and *Cacholong* (q. v.) are varieties of opal. What lapidaries call *Prime d'Opal* is clay-porphry, or other stone containing many small grains of opal. It is cut into slabs, and made into boxes and other ornamental articles; the stone which contains the opals being often artificially blackened by boiling in oil, and afterwards exposing to a moderate heat.—*Common O.* is semitransparent, white, yellow, green, red, or brown, and does not exhibit any play of colors. It is not a rare mineral, and is chiefly found in clay-porphry. *Semi-opal* is more opaque. *Wood O.* is a petrification, and exhibits the form and structure of wood, the place of which has been taken by the siliceous mineral. *Hyalite* and *Menilite* are varieties of opal.

OPEN-BILL (*Anastomus*), a genus of birds of the Heron family (*Ardeidae*), natives of the East Indies and of Africa, remarkable for the structure of the bill, the mandibles being in contact only at the base and tip, with a wide interval between their edges in the middle. They frequent the sea-coast and rivers, and prey on fish and reptiles. One species is well known in India as the *Coromandel Heron*.

OPEN DOORS, Letters of, in Scotch Law, mean a writ authorising a messenger

to pound or seize goods in lockfast-places, and to break open the locked doors in order to effect the seizure. See *HOUSE*.

**OPERA**, a musical drama, in which music forms an essential part, and not a mere accessory accompaniment. As in the higher drama, poetry supersedes the prose of ordinary life, so in the opera, with perhaps as great artistic right, the language of music is introduced at a considerable sacrifice of probability. The libretto or words are, in the modern opera, a peg on which to hang the music, rather than the music an accessory to the written drama. The component parts of an opera are recitatives, duets, trios, quartets, choruses, and finales, accompanied throughout by an orchestra, and the whole is preceded by an instrumental Overture (q. v.). Recitative is declamation, which, in its succession of musical sounds and rhythm, strives to assimilate itself as much as possible to the accents of speech, and therefore does not entirely conform to musical rhythm. The accessories of scenic representation are also present, and a Ballet (q. v.) is also frequently introduced. In some of the German operas, and in the French *opéra comique*, spoken dialogue without music takes the place of recitative. Among the different varieties of the opera enumerated are the great opera or *opéra seria*, of a dignified character; the romantic opera, embracing an admixture of the grave and lively; the comic opera or *opéra buffa*; as well as many intermediate varieties.

The idea of the opera may in part have arisen from the Greek drama, which possessed, to a considerable extent, the operatic character; the choral parts were sung, and the dialogue was delivered in a sustained key, probably resembling operatic recitative more than ordinary speech. The earliest extant example of any composition resembling the lyric drama of the moderns is Adam de la Halle's comic opera of "*Le Jeu de Robin et de Marianne*," composed in the 13th c., the music of which is wonderful for its date. The next appearance of anything like opera is in the 16th century, when various musical dramas were composed in the madrigalesque style. An opera composed by Zarlino is said to have been performed at Venice when Henry III. passed through that city on his way from Poland to France. About the same time, a pastoral called "*Dafne*," written by the poet Rinuccini, was set to music by Peri; and the same poet and musician conjointly produced the lyric tragedy of "*La Morte di Euridice*," which was represented at the theatre of Florence in 1600. Claudio Monteverde, one of a society of amateurs, known as the "*Florentine Academy*," who devoted themselves avowedly to the study and revival of Greek music, soon afterwards produced his "*Orfeo*," a "*favola di musica*," in whose performance an orchestra of no fewer than 86 performers was called into requisition, most of the instruments being, however, only used in twos or threes, and never more than ten at a time. From these beginnings, the opera advanced into one of the permanent institutions of Italy—a development of music at first strongly opposed in character and style to the music of the church. With the progress of music, and the perfecting of the musical instruments which went to form the orchestra, the lyric drama began, towards the middle of last century, to approach its present character. Of the innumerable Italian operas of last century, only Cimarosa's "*Matrimonio Segreto*" retains its place on the stage. Cherubini, the first of the more modern school, after producing his "*Quinto Fabio*" at Milan, became naturalised in France: Rossini, who succeeded him in Italy, is the greatest name in the Italian opera. Nothing can exceed the deliciously fresh character of the best known operas of this truly great musician, "*Il Barbiere di Siviglia*," "*Otello*," "*La Gazza Ladra*," "*Semiramide*," and "*Guillaume Tell*." Next to them rank the equally well-known works of Bellini, "*Norma*," "*La Sonnambula*," and "*I Puritani*;" "*Lucia di Lammermoor*," "*Lucrezia Borgia*," and "*L'Elisir d'Amore*," the three *chefs d'œuvre* of Donizetti, alone rivalling them in public estimation. A newer school of opera has recently sprung up in Italy, more grand if less fresh, of which the chief master is Verdi, whose "*Ernani*," "*Nabuccodonosor*," "*I Lombardi*," "*Otello*," "*Rigoletto*," "*Il Trovatore*," "*La Traviata*," and others have attained immense popularity in Italy, and wherever the Italian opera has been naturalised.

From Italy the opera was introduced into Germany, where, more scientific and less sensuous than in Italy, it flourished in opposition to national as well as ecclesiastical music. Germany divides with Italy the honor of perfecting orchestral music and the opera. Glück, educated in Italy, produced his "*Orfeo*" in Vienna, and then went to Paris, where the French adopted him as we did Handel. Mozart was the

first composer of operas for the modern orchestra; "Idomeneo," "Il Seraglio," "Le Nozze di Figaro," "Don Giovanni," and "Zanberföte" are his principal operatic works, unsurpassed by anything that has succeeded them. The most important German operas composed since their date are "Fidelio" by Beethoven; "Der Freischütz," "Euryanthe," and "Oberon" by Weber; "Faust" by Spohr; and the gorgeous operas of Meyerbeer, "Robert le Diable," "Les Huguenots," and "Le Prophète," and "L'Étoile du Nord." "Les Huguenots," notwithstanding its involving enormous difficulties in representation, keeps its place in every operatic theatre in Europe. Wagner, the chief exponent of a more recent school, generally known as that of the "music of the future," has produced the operas of "Tannhäuser," "Lohengrin," &c., which enjoy at present a large share of public favor in Germany, and have also become known in England.

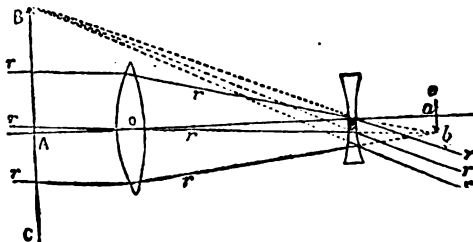
In France, the earliest operatic representation of which we have any record was in 1582. About 1669, the Abbot Perrin obtained from Louis XIV. the privilege of establishing an opera in the French language at Paris, and in 1672 the privilege was transferred to Lulli, who may be considered the founder of the French lyrical drama. Lulli's popularity continued during a long period, and was only put an end to by the rise of the German Glück, who, naturalised in Paris, produced there his "Iphigénie en Aulide" and "Alceste." It is greatly through Glück's influence that the modern French opera has become what it is, a composite work combining French, German, and Italian elements. Its best-known productions include Méhul's "Joseph," Halévy's "Juive," Anber's "Masaniello," "Fra Diavolo," and "Diamans de la Couronne," and Gounod's recent opera of "Faust." The Italian opera, introduced in Paris in 1646 by Cardinal Mazarin, and superseded in 1670, was revived in the beginning of the present century, and has since flourished side by side with the national opera of France.

The possibility of a national English opera seems first to have been shown by Purcell, who, through Humphreys, had learned much from Lulli. His music to Dryden's "King Arthur" is very beautiful, though kept throughout subordinate to the business of the drama. "The Beggar's Opera," as set to music by Dr Pepusch, was a selection of the airs most popular at the time. It has retained its place on the stage, as also has Dr Arne's "Artaxerxes," a translation from Metastasio adapted to music rich in melody. The importation of the Italian opera put a stop, for a time at least, to the further development of an opera in England. In 1706, "Arsinoë," with English words adapted to Italian airs, was performed at Drury Lane. In 1710, "Almahide," wholly in Italian, was performed exclusively by Italian singers at the Haymarket Theatre; and a succession of attempts of the kind ended in the permanent establishment of the Italian opera. The arrival of Handel in England decided the future progress of the opera. That great master was during the greater part of his life an opera composer and opera manager. He composed for the London stage no fewer than 44 operas, German, Italian, and English. These now forgotten operas were of course not the complex compositions of a later period, which could not have been performed in the then imperfect state of orchestral instruments. A recitative was set to music nearly as fast as the composer could put notes on paper, and the songs were accompanied in general by only one violin and bass, the composer sitting at the harpsichord, and supplying what was wanting. From Handel's time onwards, the opera flourished as an exotic in Britain, the singers being foreign, and the works performed being either Italian or occasionally German or French. Attempts crowned with some measure of success have latterly been made to establish an opera of a national character in England. Balfe's "Bohemian Girl" and "Rose of Castile," are the best works which this school has produced, and have attained with other operas by Balfe, Wallace, and Macfarren, a considerable measure of popularity. See Hogarth's "Memoirs of the Opera" (London, 1851).

**OPERA-GLASS** (Fr. *lorgnette* Ger. *theater-perspectiv*). This is a double telescope, which is used for looking at objects that require to be clearly seen rather than greatly magnified, such as adjoining scenery and buildings, the performers of a theatre or opera, &c. It is from its use at an opera that it derives its name. The opera-glass is short and light, and can be easily managed with one hand. Its small magnifying power (from 2 to 3 at the most), and the large amount of light admitted by the ample object-glass, enable it to present a bright and pleasing picture, so that the eye

is not strained to make out details, as in telescopes of greater power, which generally shew a highly magnified but faint picture. It allows the use of both eyes which gives to the spectator the double advantage, not possessed by single telescopes, of not requiring to keep one eye shut, a somewhat unnatural way of looking, and of seeing things stand out stereoscopically as in ordinary vision. The opera-glass is in consequence the most popular of telescopes, and requires almost no art in its use.

The opera-glass is the same in principle as the telescope invented by Galileo. It consists of two lenses, an object-lens and an eye-lens. The object-lens is convex, and the eye-lens concave. They are placed nearly at the distance of the difference of their focal lengths from one another. Fig. 1 represents the action of the telescope;  $o$  is the object-lens, and  $e$  the eye-lens, and  $oe$  is the axis of the instrument. The object-lens would form an image,  $cab$ , of the object looked at at or



near its focus, but the eye-lens intervening, converts the light converging to  $cab$  to light diverging apparently from an object in front,  $CAB$ . To shew more clearly the changes which the light undergoes, the course of a pencil of rays proceeding from the top of an object is traced. The ray proceeding from the top of the object to the centre of the lens,  $o$ , makes an angle,  $roA$ , with the axis. This is the same as the angle  $aob$ ; and either of these angles gives half the angle under which the object is seen to the unaided eye. The three extreme rays,  $r, r, r$ , of the pencil appear in the figure nearly parallel, although they come from a point. The object is at a considerable distance from the object-glass or eye, so that it is not possible in so limited a figure to shew their divergence. After passing through the object-lens, the three rays proceed to the point  $b$ , in the image which the object-lens would form at  $cab$ , if no eye-lens were there. This image, as shewn in the figure, is inverted, and would be seen as such if the eye were placed about ten inches (the distance of distinct vision) behind it. The three rays in question do not reach the point  $b$  in consequence of the eye-lens intervening, and their course onwards to that point, after passing the eye-lens, is shewn by dotted lines. The actual course, after passing the second lens, is shewn again by the full lines,  $r, r, r$ , which to the eye placed immediately behind the eye-lens appear to proceed from the point  $B$  in front. As the light comes from  $B$  in the same direction as it comes from the actual point in the object, the image is erect. What holds for the point  $B$ , holds for every point in the image and object. To find the magnifying power, it is necessary to join  $Be$ , and  $Ce$ , and produce the lines thus formed to  $b$  and  $c$ . As the eye is placed immediately behind the eye-lens, the angle under which the magnified object is seen is the angle  $BeC$ , which is equal to  $ceb$ . Now, the angle under which the object itself is seen at  $o$  or at  $e$ —for the slight difference has no effect at the distance at which objects require to be seen by a telescope—is twice the angle  $roA$ , or which is the same thing, the angle  $cob$ . The ratio of the angle  $ceb$  to the angle  $cob$ , which is the magnifying power, is easily seen to be the same as that of the line  $oe$  to the line  $oa$ . But  $oa$  is the focal length of the object-glass, and  $oe$  is the focal length of the eye-glass,

so that the magnifying power of the instrument is the number of times the focal length of the eye-glass is contained in that of the object-glass. The longer, therefore, the focal length of the object-lens, or the shorter the focal length of the eye-lens, the greater the magnifying power. This may be practically expressed thus: the flatter the object-lens, and the hollower the eye-lens, the more are objects magnified by the glass. The magnifying power may be found with sufficient accuracy by looking at an object with one eye through the tube and the other eye unaided, and so handling the glass that the magnified image seen by the one eye is superposed on the object seen by the naked eye, when a comparison of their relative sizes can be easily made. For great magnification, the instrument requires to be greatly lengthened—a condition inconsistent with its use as an opera-glass. In addition, a high magnifying power is attended with the disadvantage that the field of view, or amount of object or objects seen, becomes too limited. On screwing out the instrument, it will be seen that objects increase in size as the instrument is lengthened, but that the picture becomes more and more limited, shewing that a large power and a large field are incompatible. The opera-glass need not be set to the same precise point as is necessary with ordinary terrestrial telescopes, as the lengthening or shortening of the instrument does not produce so decided an effect on the divergence of the light; the change of divergence, caused by screwing the opera-glass out or in, is so slight as not much to overstep the power of adjustment of the eye, so that an object does not lose all its distinctness at any point within the range of the instrument. There is, however, a particular point at which an object at a certain distance is best seen.

Opera-glasses have now come into such demand, that they form an important article of manufacture, of which Paris is the great seat. So largely and cheaply are they produced in Paris, that it has nearly a monopoly of the trade. They may be had from 2s. 6d. to £6 or £7. The cheapest opera-glasses consist of single lenses, those of the better class have compound achromatic lens. A very ordinary construction for a medium price is to have an achromatic object-lens, consisting of two lenses and a single eye-lens. In the finest class of opera-glasses, which are called *field-glasses*, both eye-lenses and object-lenses are achromatic. Plossl's celebrated field-glasses (Ger. *Feldstecher*) have twelve lenses, each object-lens and eye-lens being composed of three separate lenses.

**OPERCULUM** (Lat. a lid), a term used in botany chiefly to designate the lid or covering of the mouth of the urn or capsule (*theca*) which contains the spores of mosses. Before the ripening of the spores, the operculum is generally concealed by the *calyptra*; but after the calyptra has been thrown off, the operculum itself also generally falls off, leaving the peristome visible, and the mouth of the urn open. In some cases the operculum does not fall off, and the urn opens by valves.

In Zoology, the term operculum is chiefly employed to denote the covering which many gasteropod molluscs form for the mouth of their shell. It is attached to the back of the foot of the mollusc. In some it is calcareous, forming a shelly plate; in some it is horny; whilst gasteropods very nearly allied to those which possess it, are destitute of it altogether. The operculum increases in various ways, so as to present in different genera great diversity of structure, concentric, spiral, unguiculate, &c.

**OPHICEPHALUS**, a genus of fishes, of the family *Anabasidae* (q. v.), sometimes regarded as constituting a distinct family *Ophicephalidae*, because there is a mere cavity for retaining water to supply the gills, and no pharyngeal laminae, and because of the long eel-like form and the flattened head, which is covered with large scales. Some of them are common in the fresh waters of the East Indies, are often found among wet grass, often travel from one pool to another, and are capable of subsisting for a long time in half-dried mud, descending into it when the pools dry up. The *CORA-MOTA* or *GACHUA* of India (*O. gachua*) is much used for food by the natives, although generally rejected by Europeans on account of its very snake-like appearance. It is very tenacious of life, and is not only brought to the Indian markets alive, but is cut to pieces whilst still living for the convenience of buyers.

**OPHICLEIDE** (Gr. *ophis*, serpent, and *kleis*, key), a musical wind-instrument of brass or copper, invented to supersede the Serpent (q. v.) in the orchestra and military bands. It consists of a conical tube, terminating in a bell like that of the horn, with a mouthpiece similar to that of the serpent, and ten ventages or holes, all

ophidia  
Ophthalmia

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stopped by keys like those of the bassoon, but of larger size. Ophicleides are of two kinds, the bass and the alto. The bass ophicleide offers great resources for maintaining the low part of masses of harmony. Music for it is written in the bass clef, and the compass of the instrument is from B, the third space below the bass staff, to C, the fifth added space above including all the intervening chromatic intervals. The alto ophicleide is an instrument of very inferior quality, and less used. Its compass is also three octaves and one note. The music for it is written in the treble clef, and an octave higher than it is played. Double bass or monster ophicleides have sometimes been used in large orchestras, but the amount of breath which is required to play them has prevented their coming into general use.

OPHIDIA. See SERPENTS.

OPHIOGLOSSEÆ, a suborder of *Filices* or Ferns (q. v.), consisting of a few rather elegant little plants with an erect or pendulous stem, which has a cavity instead of pith, leaves with netted veins, and the spore-cases (*theceæ*) collected into a spike formed at the edges of an altered leaf, 2-valved, and without any trace of an elastic ring. They are found in warm and temperate countries, but abound most of all in the islands of tropical Asia. Several species are European, and two are British, the *Botrychium* (q. v.) *lunaria*, or Moonwort, and the Common Adder's-tongue, (*Ophioglossum vulgatum*), which was at one time supposed to possess magical virtues, and was also used as a vulnerary, although it seems to possess only a mucilaginous quality; on account of which some of the other species have been employed in broths. It is a very common plant in England, its abundance in some places much injuring pastures.

O'PHIR, a region frequently mentioned in the Old Testament, and from which the ships of Solomon, fitted out in the harbors of Edom, brought gold, precious stones, sandal-wood, &c. The voyage occupied three years. Where Ophir was situated, has been a much, in fact, a superfluously disputed question. It was probably either on the east coast of Africa about Sofala, or in Arabia, or in India, but in which of the three countries is doubtful. Huet, Bruce (the traveller), the historian Robertson, M. Quatremère, &c., are in favor of Africa; Michaëlis, Niebühr (the traveller), Gosellin, Vincent, Winer, Fürst, Knobel, Forster, Crawford, and Kallisch, of Arabia; Vitringa, Reland, Lassen, Ritter, Bertheau, and Ewald, of India. Josephus, however, it should be said, placed O. in the peninsula of Malacca, and his very respectable opinion has been adopted by Sir J. Emerson Tennent in his work on Ceylon. For a complete discussion of the point, see Karl Ritter's "Erdkunde" (vol. xiv. 1849), 80 octavo pages of which are devoted to Ophir. According to Ritter, who accepts the view of Lassen, O. was situated at the mouth of the Indus.

OPHIR, called by the Malays, Gunung Pasaman, a volcanic mountain in the highlands of Padang island of Sumatra, lies in 0° 4' 53" n. lat., and 99° 55' e. long.; the eastern peak, called Telaman, attains the height of 9939 feet above the sea. The western peak is called Pasaman. The numerous inhabitants have cleared off forest and brought under cultivation large tracts of land on the slopes of O., and its base is studded with villages. The O. districts are most beautiful, and the lofty waterfalls, contrasting with the bright-green foliage of the mountain, highly picturesque.

•OPHISURUS. See SNAKE-EEL.

O'PHITES (Gr. *ophitai*, "serpent-brethren," from *ophis*, a serpent), a sect of Gnostics (q. v.), who while they shared the general belief of dualism, the conflict of matter and spirit, the emanations, the Demiurgos, and other notions common to the many subdivisions of this extraordinary school, were distinguished from all by their peculiar doctrine and worship connected with their *ophis* or serpent. The O., like most Gnostics, regarded the Demiurgos, or the Jehovah of the Old Testament, with great abhorrence, but they pursued this notion into a very curious development. Regarding the emancipation of man from the power and control of the Demiurgos as a most important end, they considered the serpent who tempted Eve, and introduced into the world "knowledge" and revolt against Jehovah, to have been the great benefactor of the human race. Hence their worship of the serpent. Some of the details of their system were very strange. We may instance their singular attempt to engraft "Ophism" on Christianity; their seeking, as it were, to impart to the Christian Eucharist an Ophite character, by causing the bread designed for

the Eucharistic sacrifice to be *licked by a serpent*, which was kept in a cave for the purpose, and which the communicants kissed after receiving the Eucharist (Epiph. Hor. 37, s. 5). Our information, however, regarding them is very meagre, and comes chiefly from antagonistic sources. The O. originated in Egypt, probably from some relation to the Egyptian serpent-worship, and spread thence into Syria and Asia Minor. Offshoots of this sect are the Cainites. See CAIN and SETHITES.

OPHTHALMIA (derived from the Greek word *ophthalmos*, the eye) was originally and still is sometimes used to denote inflammation of the eye *generally*, but it is at the present time usually restricted to designate inflammatory affections of the mucous coat of the eye, termed the *conjunctiva*.

There are several important and distinct varieties of ophthalmia (in the restricted sense of the word) which require special notice.

**Catarrhal Ophthalmia.**—Its leading symptoms are redness of the surface of the eye (the redness being superficial, of a bright scarlet color, and usually diffused in patches), sensations of uneasiness, stiffness and dryness, with slight pain, especially when the eye is exposed to the light; an increased discharge, not of tears, except at the beginning of the attack, but of mucus, which at first is thin, but soon becomes opaque, yellow, and thicker; pns (or matter, as it is popularly termed) being seen at the corner of the eye, or between the eyelashes along the edges of the lids, which it glues together during the night. The disease results in most cases from exposure to cold and damp, and is very apt to be excited by exposure to a draught of air, especially during sleep. It is popularly known as a *cold* or a *blight* in the eye. With regard to treatment, the patient should remain in rooms of a uniform temperature, and should at once take about five grains of calomel, followed by a black draught. The eye should be frequently bathed with poppy decoction, lukewarm or cold as the patient prefers. If the affection does not readily yield to these measures, a drop of a solution of nitrate of silver (four grains of the nitrate to an ounce of distilled water) should be let fall into the eye twice or thrice a day. It usually causes a smarting sensation for about ten minutes, after which the eye feels much easier than it did before the drop was applied. The adhesion of the eyelids in the morning may be avoided by smearing their edges at bedtime with a little spermaceti ointment.

**Purulent ophthalmia** differs from catarrhal ophthalmia in the severity of its symptoms, and in its exciting cause. It is a violent form of inflammation of the conjunctiva; is accompanied with a thick purulent discharge on the first or second day of its commencement, and is very apt to occasion loss of vision. There are three remarkable varieties of this affection, called respectively (1) purulent ophthalmia of adults, or Egyptian ophthalmia, or contagious ophthalmia; (2) gonorrhoeal ophthalmia; and (3) purulent ophthalmia of newly-born children. (1) *Purulent ophthalmia of adults* begins with the same symptoms as catarrhal ophthalmia, but in a very exaggerated form. The conjunctiva rapidly becomes intensely red, and soon appears raised from the sclerotic by the effusion of serum between them, projecting around the cornea, which remains buried, as it were, in a pit. Similar effusion takes place beneath the mucous membrane lining the eyelids, causing them to project forwards in large livid convex masses, which often entirely conceal the globe of the eye. These symptoms are accompanied by severe burning pain, great headache, fever, and prostration. When the disease is unchecked, it is liable to produce ulceration or sloughing of the cornea, with the escape of the aqueous humor and protrusion of the iris; and even when these results do not follow, vision is often destroyed by permanent opacity of the cornea. It is a common disease in India, Persia, and Egypt; and in consequence of its having been imported from the last named country into England by our troops in the beginning of the present century, it got the name of Egyptian ophthalmia. Some idea of its prevalence and of its danger may be formed from the facts (1) that two-thirds of the French army in Egypt were laboring under it at the same time, and (2) that in the military hospitals at Chelsea and Kilmatham there were, in December 1810, no fewer than 2817 soldiers who had lost the sight of both eyes from this disease. Until after the war in Egypt, the disease was unknown in Europe. Since that time it has not unfrequently broken out in this country—not only among troops, but in schools, asylums, &c. The disease is unquestionably contagious, but there are good reasons for believing that it often arises, independently of contagion, from severe catarrhal ophthalmia under unfavorable atmospheric and



other conditions; and that having so originated, it possesses contagious properties. *Gonorrheal ophthalmia* arises from the application of gonorrheal discharge or matter to the surface of the eye; and hence is more common in persons suffering from the disease from which this variety obtains its specific name. It is, moreover, not unfrequently occasioned by the common but disgusting practice, adopted by the poorer classes, of bathing the eyes in human urine, under the idea that by this procedure they strengthen the sight. In its symptoms, it is almost identical with ordinary purulent ophthalmia. The *purulent ophthalmia of children* usually begins to appear about the third day after birth. It is a very common affection, and its importance is apt to be overlooked until it has made considerable progress. If the edges of the lids appear red and glued together, and if the eye, when the lids are separated, shows redness and swelling of the conjunctiva, there is no doubt of the nature of the disease, which, if not checked, progresses in much the same way as in adults. It is, however, much more amenable to treatment, and with proper care the sense of sight is seldom impaired, provided the disease has not extended to the cornea before medical aid is sought. Of the treatment of purulent ophthalmia in these various forms, we shall say nothing more than that it must be left exclusively to the medical practitioner, whose advice should be sought as soon as there is the slightest suspicion of the nature of the case.

There is one more form of this disease which is of very common occurrence, and has received the various names of *strumous* (or *scrofulous*), *postular*, and *phlyctenular ophthalmia*. It is intimately connected with the scrofulous constitution, and is most prevalent in children from four to ten or twelve years of age. The most prominent symptom is extreme intolerance of light, the lids being kept spasmodically closed. When they are forcibly separated, a slight vascularity, usually stopping at the edge of the cornea, is observed, and at or about the line of separation between the cornea and sclerotic small opaque pimples or pustules appear. The treatment consists (1) in improving the general health by due attention to the secretions, and the subsequent administration of tonics (such as quinia and cod-liver oil), and change of air; and (2) in local applications, such as solution of nitrate of silver, or wine of opium, dropped into the eye, or stimulating ointments (such as dilute citrine ointment) smeared over the edges of the lids at bedtime. This form of disease, being dependent on constitutional causes, is often very obstinate, and is always liable to recur. It is not unfrequently attended with the annoying complication of a skin disease, known as *crusta lactea*, on the cheeks, in consequence of the irritation caused by the flow of scalding tears. The crusts or scabs are easily removed by a poultice or warm-water dressing, after which the part must be bathed by a lotion, consisting of a drachm of oxide of zinc in four ounces of either pump or rose water.

**OPHTHALMOSCOPE**, The, is an instrument recently invented for the purpose of examining the deep-seated structures of the eye, and for detecting disease in them. In its simplest form, it is merely a concave circular mirror, of about 10 inches focus, made of silvered glass or polished steel, and having a hole in the centre; and with it there is supplied, as a separate piece of apparatus, a convex lens an inch and a half in diameter, with a focal length of about two and a half inches, set in a common eye-glass frame, with a handle 3 inches long. The patient (his pupil having been previously dilated by the application of a drop of solution of atropine) is made to sit by a table in a dark room, with a sliding argand lamp placed by the side of his head, with the flame on a level with the eye, from which it is screened by a little flat plate of metal attached to the burner. The following description of the mode of using the instrument, and of the parts brought into view by it, is borrowed from the article on this subject contributed by Mr Haynes Walton to the last edition of Drutt's "Surgeon's Vade Mecum:" "The operator sits directly in front, and holding the instrument close to his eye, and a little obliquely to catch the light from the lamp, he commences, at the distance of about 18 inches from the patient, to direct the reflection on the eye. When this is got, the convex lens must be held at a distance of two and a half inches from the eye, and the focusing commenced by moving it slowly backwards and forwards. When the light fairly enters the eye, a reddish glare appears; and as it is focused, an orange-red or orange-yellow is seen; then the blood-vessels of the retina come into view. The retina itself presents a whitish aspect, through which the choroid is more or less discernible. The entrance of the optic

nerve should now be sought. The way to discern it is to make the patient look in ward. It appears as a white circular spot, in the centre of which are the central vein and artery of the retina, giving off six or eight branches." This optic disc is the most important part to be observed; but a thorough ophthalmoscopic examination will reveal structural differences, not only in it, but in the retina, choroid, and vitreous humor, and will reveal cataract in its early stage. In short, the ophthalmoscope is now as essential in the diagnosis of diseases of the deep-seated parts of the eye as the stethoscope is in the diagnosis of thoracic diseases.

OPIE, John, R.A., was born at the village of St Agnes, seven miles from Truro, Cornwall, in May 1761. His father, a master carpenter, wished him to follow the same trade, but his bias for art was strong; and his attempts at portrait-painting having attracted the notice of Dr Wolcot, afterwards celebrated as Peter Pindar, he had the advantage of his advice in the practice of the art, and his exertions in procuring him employment. And at length, in 1780, he was taken to London by Dr Wolcot, and immediately came to be acknowledged by the fashionable world as the "Cornish Wonder." This tide of good fortune soon ebbed, but not before O. had realised a moderate competency. The loss of popular favor, however, only served to bring out more strongly those points in O.'s character on which his reputation mainly rests, viz., manly independence and strong love of art. He stooped to no device to retain fashionable patronage, but calmly and unremittingly entered on that department of painting which, according to the notions of his time, was the only style of high art, viz., historical or scriptural subjects, executed on a large scale. His pencil was employed by Boydell in his well-meant and magnificent scheme to elevate British art; he also painted a number of works in the illustration of Bowyer's English History, Macklin's Poets and Biblical Gallery, and other similar undertakings. His pictures of the "Murder of James I. of Scotland," "The Slaughter of Rizzio," "Jephthah's Vow," "Presentation in the Temple," "Arthur and Hubert," "Belshazzar and Juliet in the Garden," are his most noted works. O. was elected an Associate of the Royal Academy in 1786, and Academician in the following year. He devoted part of his time to various literary efforts tending to the illustration of art; these were chiefly the "Life of Reynolds" in Dr Wolcot's edition of Pilkerton's "Dictionary of Painters;" a letter in the "North Briton," recommending the formation of a National Gallery, reprinted as "An Inquiry into the Requisite Cultivation of the Fine Arts in Britain;" lectures on art, delivered at the Royal Institution, which, though listened to with great attention by a select and fashionable audience, do not seem to have been satisfactory to himself, as he declined to continue them. When Fuseli, on being appointed keeper, resigned the professorship of painting, O. was appointed to that office; and the four lectures which he delivered—he died before completing the course—bear the stamp of practical experience and shrewd observation. O. was twice married. He obtained a divorce from his first wife; but his second, well known as one of the most popular novelists of the day, appreciated his high character, which she set forth, after his death, in a memoir published along with his lectures. He died somewhat suddenly in his house, St Bernard Street, Oxford Street, April 9, 1807, and was buried in the crypt of St Paul's, near the grave of Reynolds.

OPINICUS, one of the fabulous creatures known in Heraldry, with the head and neck of an eagle, the body of a lion, wings, and a short tail like that of a camel. Such a monster, with wings endorsed or, was the crest of the company of barber-surgeons of London.

OPINION OF COUNSEL is the technical name for the advice given by a barrister or advocate. The attorney or solicitor writes a statement of facts, called "a case" in England, and "a memorial" in Scotland, which ends by asking certain queries, and the answer written by the counsel is his opinion. A counsel is not liable for any damages caused by his giving a wrong opinion though the result of gross ignorance, this being one of the privileges of counsel.

OPITZ, Martin, a famous German poet, was born December 23, 1597, at Bunzlau, in Silesia. He received an education of the highest kind; and after some time spent at the court of the Duke of Liegnitz, he accepted, in 1622, an invitation by Bethlen Gabor, Prince of Transylvania, to teach Philosophy and the *Humaniora* at

Weissenburg; but disliking the rudeness of the country, he soon returned to the court of the Duke of Liegnitz. In 1624, his first poems were published, and in the same year his work "Von der deutschen Poeterei," in which he laid the foundation or a system of German poetics. In 1625, he went to Vienna, where, on account of an elegy on the death of an archduke, he received a laurel crown from the hands of the emperor, Ferdinand II. In 1626, he became secretary, although a Protestant, to the Burggraf, Karl Hannibal of Dohna, a distinguished Roman Catholic and imperialist, and was employed in various transactions with foreign courts. In 1629, the emperor raised him to the rank of nobility. After the death of the Burggraf of Dohna, in 1633, he returned to the courts of Liegnitz and Brieg. About this time he published "Vesuv," a didactic poem, and his "Trostgedicht in Widerwärtigkeit des Kriegs," the best of his poems, which were followed by an opera called "Judith," a translation of the "Antigone" of Sophocles, and a translation of the Psalms. In 1638, he was appointed Secretary and Historiographer to Ladislaus IV. of Poland. But in the midst of his days, and when he had attained to fame and prosperity, he was cut off by the plague at Danzig, August 20, 1639. O. was more honored by his contemporaries than almost any other poet ever was. German poetry, which had been neglected and despised, began again to be esteemed and cultivated. The popularity of O., and his relations with the chiefs of the Roman Catholic party, led to the adoption, throughout the whole of Germany, of the form given to the German language by Luther, which had previously obtained general acceptance only in the Protestant states. His poetry is characterised by careful attention to language and metre, and by reflection rather than by brilliant fancy or deep feeling. There are several editions of his works, but none is quite complete (3 vols. Breslau, 1690; 3 vols. Amst. 1646; and 3 vols. Frankfurt and Leipzig, 1724).

OPÍUM, one of the most valuable of medicines, is the dried juice of the unripe capsules of a species of Poppy (q. v.). *Papaver somniferum*, sometimes called the Common Poppy, and sometimes the White Poppy, although the latter name is really appropriate only to one of its varieties. The plant is probably a native of some of the warmer parts of Asia, although it is now common in cultivated and waste grounds throughout all the south and middle of Europe, and is occasionally found in Britain. It is an annual, varying in height from one to six feet; erect, branched, of a glaucous green color, with ovate-oblong sessile leaves, the stem and leaves generally smooth, the branches terminated by large flowers on long stalks, the capsules globose or roundish-ovate and smooth. There are two principal varieties cultivated for the opium which they yield, which have been regarded by some botanists as distinct species; the one (*Papaver somniferum*) having generally red or violet-colored flowers, numerous flower-stalks rising together, globose capsules opening by a circle of pores under the persistent stigma, and black seeds; the other (*P. officinale*) having white flowers, solitary flower-stalks, the capsules somewhat ovate, the circle of pores almost wanting, the seeds white. The former variety is generally cultivated in the mountainous parts of the north of India, the latter in the plain of Bengal, where the poppy-fields are described by Dr Hooker as resembling green lakes studded with white water-lilies. The cultivation of the poppy for the sake of opium is carried on in many parts of India, although the chief opium district is a large tract on the Ganges, about 600 miles in length and 200 miles in breadth, which was divided by the East India Company into two agencies, that of Behar and that of Benares, the central factory of the former being at Patna, and that of the latter at Ghazepore. The poppy is also extensively cultivated for opium in the Asiatic provinces of Turkey, in Egypt, and in Persia. Opium of very good quality is also produced, although not to any considerable amount, in some parts of Europe, and even in Britain. It is sometimes alleged that a much warmer climate than that of Britain is requisite for the profitable production of opium, but the chief fault of the climate seems rather to be the frequency of wet weather. Very fine specimens of opium have been produced, and the produce per acre has been found amply remunerative; but a great difficulty is experienced in obtaining labor at a moderate rate for a few days only at a time, and when the experiment is conducted on a small scale, only for a few hours daily. This difficulty was much felt in an experiment, otherwise most successful, which was made at Edinburgh, by Mr Young, a surgeon, who about the year 1830 obtained 56 lbs. of opium from one acre of poppies, and sold it at 36s. a lb. It was of excellent quality. His mode of cultivation was similar to that usual in India. The seed

being sown in spring on a rich soil, the plants were kept clear of weeds, and when they had flowered and produced capsules, incisions were made in the capsules, and the exuded juice collected as described below. The capsules vary from the size of a hen's egg to that of the fist. In India, the poppy flowers in the end of January and beginning of February.

The poppy requires for its profitable cultivation a rich soil, and in India is generally sown in the neighborhood of villages where manure can be easily obtained. The soil ought to be fine and loose when the seed is sown. The subsequent cultivation consists chiefly in thinning and weeding. Irrigation is practised. Mild moist weather, with night-dews, is deemed most favorable during the time of the collection of the opium. Very dry weather diminishes the flow of the juice, and much rain is injurious.

The opium poppy is cultivated for other purposes besides the production of opium, concerning which see POPPY.

Opium, as a commercial article, is of great importance, exceeding indeed that of any other drug in use, and the cultivation of the opium poppy (*Papaver somniferum*) in British India forms a most extensive branch of agriculture, and the collection and preparation of the drug itself employs a large number of persons in the Patna, Malwa, and Benares districts of Bengal. Indeed during the whole existence of the East India Company, the production of this drug was of the first importance; its employment as a habitual narcotic, as well as a medicine amongst all the eastern nations, demands an enormous supply. The seed is sown in India in the beginning of November; it flowers in the end of January, or a little later; and in three or four weeks after, the capsules or poppy-heads are about the size of hens' eggs, and are ready for operating upon. When this is the case, the collectors each take a little iron instrument called a *mushtur*; it is made of three or four small plates of iron, narrow at one end and wider at the other, which is also notched like a saw; with these instruments they wound each full-grown poppy-head as they make their way through the plants in the field. This is always done early in the morning, before the heat of the sun is felt; during the day the milky juice of the plant oozes out, and early on the following morning it is collected by scraping it off with a kind of scoop, called a *sillooha*, and transferred to an earthen vessel, called a *kurrace*, hanging at the side of the collector. When this is full, it is carried home and transferred to a shallow open brass dish, called a *thaller*, and left for a time tilted on its side, so that any watery fluid may drain out; this watery fluid is called *puaseewah*, and is very detrimental to the opium unless removed. It now requires daily attendance, and has to be turned frequently, so that the air may dry it equally, until it acquires a tolerable consistency, which requires three or four weeks; it is then packed in small earthen jars, and taken to the *godowns* or factories; here the contents of each jar are turned out, and carefully weighed, tested, valued and credited to the cultivator. The opium is then thrown into vast vats, which hold the accumulations of whole districts, and the mass being kneaded, is again taken out and made into balls or cakes for the market.

This is a very important operation, and is conducted in long rooms, the workmen sitting in rows, closely watched by the overseers to insure the work being carefully performed. Before each workman is a tray, and within easy reach is placed the *tagar*, a tin vessel for holding as much opium as will make three or five balls. On the tray is another basin containing water, and a smaller tray; on this tray stands a brass cup, into which the ball or cake is moulded, also a supply of thin layers of poppy petals, formed by laying them out overlapping each other, and pressing them upon one another; these are prepared by women in the poppy-fields, and with these is a cup filled with a sticky fluid called *lewah*, made from opium of inferior quality. The operator begins his work by taking the brass cup and placing on its bottom one of the cakes of poppy petals, which he smears over with the *lewah*; then adds other cakes of petals to overlap and adhere to the first, until the cup is lined and a coat of petals is thus formed for the opium, of which he takes the exact quantity as near as he can guess, works it into a ball, and places it in the basin, so that the lining of petals encloses it and sticks to it, in consequence of the *lewah* smeared on the inner side of the thin cakes of petals. Other petals are put on the upper part of the ball, and the whole gathered round it, forming a case about as thick as a bank-note. Each man's work for the day is kept by itself, and after having been duly registered,

is taken to a vast drying-room, where the balls are placed in tiers on lattice-work racks, and are continually turned and examined by boys, to keep them from insects and other injuries. After being fully dried, these balls are packed in chests for the market.

The manufacture of opium is carried on to the greatest extent in India, but large quantities are also made in Turkey, and this latter is considered the best in quality. It is also made at Trebizond in Persia, and in Egypt; occasionally it has been produced in Germany, France, and England. Of the Indian opium there are several qualities, as Bengal, Patna or Benares opium, Garden Patna, Malwa, fine Malwa, Cutch, and Kandesh opium.

The net opium revenue for India in 1871-1872 was £7,657,212. The number of chests sold was 49,695, at £139 per chest, or £26 higher than the previous year's average. The net profit was £90 per chest. The area under cultivation in Bengal and Bombay was 560,608 acres. In 1873-4, 94,746 chests of opium, valued at £1,195,092, were exported. Next to China, the largest consumption of Indian opium is by the Burmese and the natives of the Malacca Straits, who take annually to the value of nearly a million sterling.

In Europe, with very slight exceptions, opium is used for medicinal purposes only, and large quantities of it undergo a still further stage of manufacture, in order to separate from it the active principles morphine, narcotine, &c. In Great Britain, the chief manufacture of these salts of opium is carried on in Edinburgh, where two firms, Messrs T. and H. Smith, and J. F. Macfarlane & Co., have attained great reputation, and manufacture these products upon an immense scale, supplying probably a fifth of the whole quantity manufactured.

**Chemical and Medicinal Properties.**—The only variety recognised in the British pharmacopœia is the Turkey opium. The chemical composition of opium has been studied by various chemists, amongst whom must be especially mentioned Professor Mulder of Utrecht, and Professor Anderson of Glasgow. The following constituents occur in most kinds of opium:

Organic Bases or Alkaloids.	Meconic Acid, $3\text{HO}, \text{C}_{15}\text{H}_{11}\text{O}_{11}$ , from 4 to 8 per cent.		
	Morphia .....	$\text{C}_{17}\text{H}_{19}\text{NO}_5$ , from 4 to 12	"
	Codeia .....	$\text{C}_{18}\text{H}_{21}\text{NO}_5$ , less than 1	"
	Thebala .....	$\text{C}_{20}\text{H}_{23}\text{NO}_6$ , "	"
	Papaverine .....	$\text{C}_{26}\text{H}_{27}\text{NO}_8$ , "	"
	Narcotine .....	$\text{C}_{18}\text{H}_{25}\text{NO}_{14}$ , from 6 to 10	"
	Narceia .....	$\text{C}_{18}\text{H}_{25}\text{NO}_{18}$ , from 6 to 18	"
	Meconine .....	$\text{C}_{20}\text{H}_{29}\text{O}_8$ , less than 1	"
	Resinous Matter....	from 2 to 4	"
	Caoutchouc .....	from 4 to 6	"
Mucilage, Gum, and Extractive }		from 40 to 50	"
Matters .....			

In addition to the six alkaloids named in this table, a seventh, named opianine, has been found in Egyptian opium, but in no other varieties.

Some of the most important and characteristic of these constituents, as meconic acid, morphia, and narcotine, are noticed in special articles. The only isolated constituents of opium which are now used in medicine are *Codeia* (so called from the Greek word *kodia*, a poppy-head), which has been asserted by Magendie and others to act in the same manner as, although less powerfully than, morphia, but which is now seldom prescribed, as it is not a pharmacopœial preparation; and *Morphia*, which has already been described.

The only test given in the British pharmacopœia for the purity of opium is the determination of its percentage of morphia, which is a process requiring a considerable amount of chemical skill.

Following the arrangement adopted by Pereira ("Elements of Materia Medica" 4th ed.), we have just quoted, we shall consider (1) the effects of one or a few doses of opium employed medicinally or as a poison; (2) the effects of the habitual employment of opium, either by chewing or smoking it; and (3) its good and bad effects on the different systems of organs.

1. In *small doses*, as from a quarter of a grain to a grain, it acts as an agreeable stimulant, this effect being followed by a desire to sleep, accompanied by dryness of

the month and throat, thirst, and slight constipation. When it is given in a *full medicinal dose* (as from two to four grains), the stage of excitement is soon followed by well-marked depression or torpor, both of the bodily and mental organs, and an almost irresistible sleepiness; these effects being usually succeeded by constipation, nausea, furred tongue, headache, and listlessness. When it is administered in a dangerous or poisonous dose, the symptoms, as summed up by Dr Christison in his work "On Poisons," begin with giddiness and stupor, generally without any previous stimulus. The stupor rapidly increasing, the person becomes motionless, and insensible to external impressions; he breathes very slowly, generally lies quite still, with his eyes shut and the pupils contracted; and the whole expression of the countenance is that of deep and perfect repose. As the poisoning advances, the features become ghastly, the pulse feeble and imperceptible, the muscles exceedingly relaxed, and, unless assistance is speedily procured, death ensues. If the person recovers, the insensibility is succeeded by prolonged sleep, which commonly ends in twenty-four or thirty-six hours, and is followed by nausea, vomiting, giddiness, and loathing of food.

2. The *habitual use of opium*, whether the drug be eaten or smoked, is undoubtedly in most cases injurious to the constitution, although probably not to the extent that some eastern travellers assert. Sir R. Christison and other eminent physicians have shewn that in numerous cases very large quantities of this drug may be regularly taken with impunity; and Dr Chapman ("Elements of Therapeutics," vol. ii. p. 199) relates two remarkable cases of this kind—one in which a wineglassful of laudanum was taken several times in the twenty-four hours, and another (a case of cancer of the uterus) in which the quantity of laudanum was gradually increased to *three pints* daily, a considerable quantity of solid opium being also taken in the same period.

3. *Opium-smoking* is a habit that is chiefly confined to China and the islands of the Indian Archipelago. An extract, called *chandoo*, is made into pills about the size of a pea. The following is the account given by Marsden in his "History of Sumatra," of the process employed:—"One of these pills being put into the small tube that projects from the side of the opium pipe, that tube is applied to a lamp, and the pill being lighted, is consumed at one whiff or puffation of the lungs, attended with a whistling noise. The smoke is never emitted by the mouth, but usually receives vent through the nostrils." Although the immoderate practice of opium-smoking is most destructive to those who live in poverty and distress, yet from the evidence of Mr Smith, a surgeon resident at Pulo Penang, and of Dr Eatwell, who passed three years in China, it does not appear that the Chinese in easy circumstances, and who have the comforts of life about them, are materially affected in respect to longevity by addiction to this habit.

3. As the discussion of the physiological action of opium on the different organs would, in its most condensed form, occupy too much space, we shall confine our remarks to the practical conclusions at which physiologists and physicians have arrived respecting the utility and the danger of prescribing this drug in various conditions of the principal vital organs.

a. *Cerebro-spinal System*.—Under proper regulations it is a remedy which may be used to stimulate the circulation within the cranium, to promote sleep, to diminish abnormal or increased sensibility, and to allay pain generally; while it is contra-indicated in apoplexy, cerebral inflammation, paralysis, and hysteria. Dr Pereira relates a case in which *one grain* of opium, administered to an hysterical young woman, proved fatal.

b. *Digestive System*.—"Under proper regulations," says Pereira, "opium is an admissible remedy for the following purposes: to diminish excessive hunger; to allay pain, when unaccompanied by inflammation; to diminish the sensibility of the digestive organs in cases of acrid poisoning, and in the passage of biliary calculi; to produce relaxation of the muscular fibres of the alimentary canal in colic, and of the gall-ducts in the passage of calculi, and to diminish excessive secretion from the intestinal canal in diarrhoea;" while it is contra-indicated "in diminished secretion from the gastro-intestinal membrane, in extreme thirst, in loss of appetite and weak digestion, in obstinate costiveness, and in diminished excretion of bile."

c. *Vascular System*.—In vascular excitement with great diminution of power, as after hemorrhage, opium is often serviceable; but when the pulse is strong as well

as quick, or when there is simultaneously a tendency to abnormal sleepiness, it is contra-indicated.

*d. Respiratory System.*—"Opium, under proper regulations, may be useful to diminish the contractility of the muscles of respiration, or of the muscular fibres of the air-tubes, as in spasmodic asthma; to diminish the sensibility of the bronchia in the second stage of catarrh, and thereby to allay cough by lessening the influence of the cold air; and, lastly, to counteract excessive bronchial secretion;" while it is contra-indicated in difficulty of breathing, arising from a deficient supply of nervous energy, as in apoplectic cases; in cases in which the venous is imperfectly converted into arterial blood; and in the first stage of catarrh and pneumonia, both from its checking secretion, and from its tendency to impede the due arterialisation of the blood.

*e. Urinary System.*—Opium is a valuable remedy to allay the pain in the kidney and adjacent parts in cases of renal calculi, and also to produce relaxation of the ureters when the calculi are passing along these tubes; it is also of great service in certain forms of irritable bladder.

There can be no doubt that the essential and primary operation of opium is on the nervous system, the other effects being for the most part secondary.

Opium is undoubtedly the most valuable remedy of the whole materia medica. "For other medicines," says Dr Pereira, "we have one or more substitutes; but for opium, none—at least in the large majority of cases in which its peculiar and beneficial influence is required." We not only exhibit it to mitigate pain, to allay spasm, to promote sleep, to relieve nervous restlessness, to produce perspiration, and to check profuse discharges from the bronchial tubes and intestinal canal; but we also find it capable of relieving some diseases in which none of the above indications can be always distinctly perceived. In combination with tartar emetic, it has been strongly recommended in fever with much cerebral disturbance; in association with calomel, it is the most trustworthy remedy in cases of inflammation of membranous parts; in insanity, its value cannot be overestimated; it is the remedy chiefly trusted to in delirium tremens; it is more serviceable than any other medicine in diabetes; and to conclude with a more common and less serious affection, its efficiency, when administered in small doses (as ten or fifteen drops of tincture three times a day), in promoting the healing of ulcers in which granulation proceeds too slowly is very marked.

In addition to the solution of Muriate of Morphia (q. v.), which, on the whole, is the best preparation of opium for internal use in the majority of cases, the British pharmacopœia contains an opium pill (containing one part of opium in five of the pill); a pill of lead and opium (chiefly used in pulmonary hemorrhage); an aromatic powder of chalk and opium (containing one part of opium in forty of the powder); powder of Ipecacuan and opium (or Dover's Powder [q. v.], containing one part of opium in ten of the powder); powder of kino and opium (containing one part of opium in twenty of the powder, and, like the aromatic powder, chiefly used in diarrhoea); tincture (see LAUDANUM), and camphorated tincture of opium (commonly known as Paregoric Elixir, and much used in chronic cough—containing two grains of opium in the fluid ounce); in addition to an enema; a wine (used chiefly as a local application to the eye in cases of ophthalmia); an ointment of galls and opium (used as an external application to piles); and a liniment and a plaster, which are applied to remove local superficial pains.

In a case of poisoning by opium, the first and most essential point is the evacuation of the contents of the stomach. The stomach-pump, if it can be procured, should be employed, and strong coffee should then be pumped into the stomach after the removal of its contents. The next best remedy is an emetic of sulphate of zinc (about a scruple), and if this is not at hand, a dessert-spoonful of flour of mustard, stirred up in a tumbler of warm water, will usually produce the desired effect. The patient must, if possible, be prevented from falling asleep, and for this purpose he should be kept constantly walking between two strong men, while a third person in the rear should, at short intervals, flick him sharply with a rough wet towel, or (if procurable) a good birch rod. Cold water should also be occasionally dashed over the head and chest. In a few apparently hopeless cases, death has been averted by artificial respiration, and by the application of electro-magnetism.

**OPOBA'LSAMUM.** See **BALSUM** and **GUM**.

**OPODE'LDON** is a popular synonyme for *Soap Liniment* (q. v.). The origin of the term, which was apparently applied by Paracelsus to various forms of liniments or local applications, is not known. The *opo* is the same as the *opo* of *opoponax*, *opobalsamum*, &c., and is doubtless derived from the Greek *ῥοπα*, juice. It has been suggested by an eminent Anglo-Saxon scholar that the original word was *opodilla*, and that *don* or *dock* was added merely as a gloss to *dilla*—a view that is confirmed by the fact, that in Ælfric's "Glossary," *dill* (*dilla*) is Englished by *dock*.

**OPO'PONAX**, a gum resin obtained by puncturing the roots of a species of *parisip* (*Pastinaca Opoponax*). The chief interest in this material is the great importance which the ancient physicians attached to it as an antispasmodic medicine. It was employed by Hippocrates, Theophrastus, and Dioscorides, who have each left descriptions of it. The plant grows generally throughout Southern Europe, and the gum is still collected, but is not much used.

**OPO'RTO** (Portug. *O Porto*, the port), a city of Portugal, and, after Lisbon, the most important seaport of the country, in the province of Minho, on the right bank, and two miles from the mouth of the Douro, in lat. 41° 9' n., long. 8° 37' w.; and is 195 miles north-north-east of Lisbon. Though possessing few imposing edifices, the town, seen from a distance with its irregular outline marked with many towers, its whitewashed houses gleaming among trees and terraced gardens, has a fine picturesque effect. Its picturesqueness, however, has been secured at the cost to a great extent of comfort, as many of its streets are narrow, dirty, and so steep as to be impassable for carriages. Of the old walls that surrounded the ancient town, remains are still to be seen. The principal street is the *Rua Nova dos Ingleses*, a spacious, handsome, modern thoroughfare, from which a good view of the Bishop's Palace, which seems to be hung high in the air, is obtained. Here is situated one of the finest edifices in O., the English Factory House, a building of white granite with a beautiful façade, and comprising on a magnificent scale all the appearances of a club-house, as ball-room, library, refreshment-room, &c. The houses in the *Rua Nova de S. Joao*, the most regular street in the city, are lofty, and are faced with gaily painted and gilt balconies. Of the 11 squares, the greatest is the *Praça de S. Ovidio* on a height, the appearance of which is enhanced by beautiful buildings and a terrace, with a fine seaward view, planted with trees. On the high rocks, on the southern bank of the river, stands the convent of *da Serra*, which at one time was extraordinarily rich. The most beautiful of the convents was that of *S. Bento*, now converted into barracks. The cathedral, which must originally have been a noble edifice, but has been infamously modernised, stands near the Bishop's Palace. The *Torre dos Clerigos* (Tower of the Clergy), said to be the highest in Portugal, was built in 1748. Formerly, there were in all 60 convents and chapels in the city. Of existing institutions, there are four hospitals, and numerous educational and benevolent establishments. O. is the principal industrial seat in the country. It carries on manufactures of linen, silk, cotton, and woollen fabrics, cloth of gold, silk and cotton hosiery, lace, buttons, gold and silver wire, cutlery and hardware, excellent furniture, pottery, glass, leather, paper, hats, sails, and the articles required on ship-board. Royal tobacco and soap-works, two iron-foundries, and several sugar-refineries are also in operation. The entrance to the Douro is rendered highly dangerous by a shifting bar of sand; but yet the commercial traffic on the river is considerable. The exports of wine were larger in 1874 than in any former year, amounting to 301,310 hectolitres, of which seven-elevenths was shipped for England. In 1871 O. imported cotton goods from England to the value of £329,498; woollen goods, £29,413—more than in any former year. O. builds very fast-sailing ships. In 1875 the port owned 137 ships of 83,540 tons. Pop. of O. 76,000.

¶ In ancient times the site of O. was occupied by the harbor-town *Portus Cale*, afterwards *Porto Cale*, from which has been derived the name of the kingdom, Portugal. It was an important city during the supremacy of the Moors, was destroyed in 820 by Almanzor of Cordova, but was restored and peopled by a colony of Gascons and French in 999. It was famous for the strength of its fortifications during the middle ages, its walls being 3000 paces in circumference, 30 feet in height, and flanked



with towers. From the 17th to the present century, O. has been the scene of an unusual number of popular insurrections. In 1808, it was taken by the French; but in the following year it was retaken by an Anglo-Portuguese force under Wellington. In 1832, Dom Pedro, the ex-Emperor of Brazil, was unsuccessfully besieged in this city by the forces of Dom Miguel.

**OPOSSUM** (*Didelphis*), a genus of *Marsupialia*, having ten cutting teeth in the upper jaw, and eight in the lower, one canine tooth on each side in each jaw, three compressed premolars, and four sharply-tuberculated molars on each side—fifty teeth in all; the tongue bristly; the tail long, prehensile, and in part scaly; the feet plantigrade; five toes on each foot, their claws long and sharp; but the inner toe of the right foot converted into a thumb, destitute of a claw, and opposable to the other digits; the muzzle long and pointed, the mouth very wide, the ears large and destitute of hair. The unwebbed feet and non-aquatic habits distinguish this genus from *Cheloneutes* (q. v.), also belonging to the family *Didelphidae*. But the genus *Didelphis* itself is divided by some naturalists into several genera; and there are differences not unimportant, particularly in the well-developed pouch of some species, and the merely rudimentary pouch or abdominal folds of others. All the existing species are American, but fossil species are found in other parts of the world. The opossums were the first marsupial animals known, and are noticed as very wonderful creatures by some of the earliest writers on America. Some of the smaller species much resemble rats and mice, except in their long and pointed muzzle; others greatly resemble shrews; the largest known species are scarcely equal in size to a large cat. It is in some of the smaller species that the pouch is rudimentary; all the larger species have a well-developed pouch, in which the young are carried, and to which, even after beginning to venture forth from it, they retreat on the approach of danger. The young of the species which have a merely rudimentary pouch, also remain attached to the nipple of the mother for a time; and afterwards for a time are carried on her back, intertwining their prehensile tails with hers, and clinging to the fur of her back.—The VIRGINIAN O. (*D. Virginiana*) is one of the largest species. It abounds in the warmer parts of North America, and its range extends considerably to the north of Virginia. Its form is robust, its head very large, its color dull white; its fur long, fine, and woolly, thickly interspersed with longer coarse white hairs, except on the head and some of the upper parts, where the hair is short and close. The tail is not quite so long as the body. The Virginian O. lives much in forests and among the branches of trees, to which it usually retreats to devour its prey, twining its tail around a branch for security. Its food consists of small quadrupeds and reptiles, birds' eggs, and insects; also in part of fruits and the juicy stalks of plants. It often visits poultry-yards, and displays much cunning in its stealthy quest of prey; although otherwise it seems, like the other *Marsupialia*, to be very low in the scale of intelligence. It seeks to escape from enemies by running to the woods and ascending a tree; but if escape is impossible, it feigns death, and maintains the posture in very trying circumstances, however it may be kicked and beaten; but the true state of the case may be ascertained by throwing it into water. The American word "*possuming*" makes a figurative application of this part of the natural history of the opossum. The female sometimes produces sixteen young at a birth; the young when born are blind, naked, and shapeless, and weigh scarcely more than a grain each; they do not begin to leave the pouch until they have attained about the size of a mouse. The female O. shows a very strong attachment to her young. The O. is very easily tamed, but its strong odor makes it an unpleasant pet. The flesh of the O. is said to be good. The hair is woven into garters and girdles by the Indian women.—Other species of O. are found in the more southern parts of America. Of these, one of the largest is the CRAB-EATING O. (*D. cancrivora*) of Guiana and Brazil; which is nearly as large as the Virginian O., lives chiefly in marshy places, and feeds much on crabs. The smaller species are numerous in the tropical parts of America.—The name O. is often given in Australia to the Phalangiers (q. v.).

**O'PFENHEIM**, a town of the grand duchy of Hesse-Darmstadt, in the province of Rhenish Hesse, on the left bank of the Rhine, 10 miles south-by-east from Mayence, and on the railway between Mayence and Spire. It stands on the steep slope of a hill abounding in vineyards, and carries on a pretty active trade in wine. O.

occupies the site of the Roman castle of Banconla, and was made a royal palatinate under the Carolingians. It afterwards became one of the most important free towns of the empire. It was taken in 1218 by Archbishop Adalbert of Mayence, in 1620 by the Spaniards, in 1631 by the Swedes under Gustavus Adolphus, and in 1634 by the Imperialists, suffering much upon all these occasions. In 1689, the French under Melac almost entirely destroyed it. The church of St Cantharine, a fine specimen of the German architecture of 1282—1317, a kind of miniature of the Cologne cathedral, lies yet in a ruinous condition, except the eastern part, which was restored in 1338—1343. Pop. (1871) 8085.

**O'PELN**, a town of Prussian Silesia, capital of the government district of the same name, on the Oder, 51 miles south-east of Breslau. Since 1816, when it was erected into an especial seat of government for Upper Silesia, the town has been much beautified both with new edifices and with parks and gardens. It contains four churches—one of which, Adelbert's Church, was founded in 995—an old castle on the island Pascheke in the channel of the Oder, a town-house, and theatre. Pop. (1871) 11,879, who carry on a considerable transit-trade in timber, zinc, lead, hardware, cattle, and wiles; and manufacture ribbons, linen goods, leather, and pottery.

**OPPOSITION**, the party in either House of the British parliament who are opposed to the existing government, and who would probably come into power on its displacement. The existence of a fair and temperate opposition, keeping a watch over the acts of the ministry, is undeniably conducive to good government; while, on the other hand, the conduct of public affairs may be seriously embarrassed by an opposition whose proceedings are conducted in a factious or obstructive spirit. The name Opposition is not generally applied to a party, merely because opposed to the existing administration, if there is no likelihood of their succeeding to power on a change of government.

**OPTIC NERVE.** See **EYE**.

**O'PTICAL ILLUSION.** Of all the senses none is more deceptive than the sense of sight; it often deceives us as to the distance, size, shape, and color of objects; it frequently makes them appear as if in situations where their existence is impossible; and often makes us think them movable when they are not so, and *vice versa*. An object appears to us as large or small, near or distant, according as the rays from its opposite borders meeting at the eye form a large or a small angle: when the angle is large, the object is either large or near; when small, the object must be small or distant. Practice alone enables us to decide whether an object of large apparent size is so on account of its real size, or of its proximity; and our decision is arrived at by a comparison of the object *in position*, with other common objects, such as trees, houses, &c., which may chance to be near it, and of which we have by experience come to form a correct idea. The same is, of course, true of apparently small objects. But when all means for comparison are removed, as when we see a distant object floating on an extensive sheet of water, or erect in an apparently boundless sandy plain, where no other object meets the eye, then our judgment is completely at fault. Imperfection in the acquired perceptions of sight, as it is called, produces many other illusions; it leads us to consider spherical solids at a distance as flat discs, and deceives us regarding the size of objects, by their color; the sun appears larger than he would if illumined by a fainter light, and a man in a white habit seems larger than he would if he wore a dark dress. Illusions are also produced by external causes; and instances of this sort are given under **MIRAGE**, **REFLECTION**, and **REFRACTION**.

The property which the eye possesses of retaining an impression for a very brief, though sensible period of time (about one quarter of a second), after the object which produced the impression has been removed, produces a third class of illusions. Common examples of this are the illuminated circle formed by the rapid revolution of an ignited carbon point, piece of red-hot iron, or other luminous body, and the fiery curve produced by a red-hot shot projected from a cannon.

Another form of illusion is produced to a person who is seated in a vehicle in motion, and it is very deceptive when the motion is so equable as not to be felt by the person himself. The illusion is most complete when the attention is riveted on an object several yards off; this object then appears as a centre round which all the other objects seem to revolve, those between the observer and the object moving

backwards, and those beyond the object moving forwards. This illusion occurs on a larger scale in the apparent motion of the heavenly bodies.

Other illusions arise from a disordered state of the organs of vision; such are the seeing of things double or movable (if they are not so), or of a color different from the true one; the appearance as of insects crawling over a body at which the eye is directed, &c.

**OPTICS** is the science whose object is the investigation of the laws that regulate the phenomena of light and vision. The nature of light will be found treated of under **LIGHT**, and its various properties under **CHROMATICS**, **DIFFRACTION**, **INTERFERENCE**, **LENS**, **POLARISATION**, **REFLECTION**, **REFRACTION**, **SPECTRUM**, &c.; and we shall confine ourselves in this article to a historical sketch of the rise and progress of the science.

Optics, as a science, is entirely of modern growth, for though the Greeks and their disciples the Arabs had made some progress in mathematical optics, their knowledge was confined to the law of reflection and its more immediate consequences. Euclid, Aristotle, Archimedes, Hero, and Ptolemy were acquainted with the fact that light is transmitted in straight lines, but with the important exception of Aristotle, and some of his followers, the ancient philosophers believed that rays proceeded from the eye to the object, instead of in the contrary direction. Ptolemy was well acquainted with atmospheric refraction. Alhacen (1010) and Vitellio the Pole (1260) were almost the only cultivators of this science during the middle ages, and their additions to it were unimportant. The lens, though known from early antiquity, was not applied as an aid to defective eyesight till after the time of Roger Bacon. Jansen, Metius, and Galileo separately invented the telescope about the beginning of the 17th c.; and the last mentioned philosopher, by its means, made various important astronomical discoveries. Kepler, a short time after, gave the true theory of the telescope, explained the method of finding the focal length of lenses, and applied it to find the magnifying power of the telescope, besides pointing out the mode of constructing an instrument better adapted for astronomical purposes than that of Galileo; he also made some useful experiments on the nature of colors, and shewed that images formed on the retina of the eye are inverted, a fact previously discovered by Maurolycus of Messina. From this period the science of optics steadily advanced, and its treasury of facts received numerous additions through the labors of De Dominis, Snell (the discoverer of the law of refraction in 1621), Descartes, Fermat, Barrow, Mariotte, and Boyle. Up to the time of Newton it was generally believed that color was produced by refraction, but that philosopher shewed by a beautiful series of experiments that refraction only separates the colors already existing in white light. In his hands the theory and construction of the telescope underwent many valuable improvements, and in 1672 the description of his reflecting telescope was submitted to the Royal Society. Gregory had constructed an instrument on similar principles some years before. About the same time, Grimaldi made his interesting series of experiments on the effects of diffraction, and noticed the remarkable fact of the interference of one pencil of light with the action of another. The complete theory of the rainbow, with an elegant analysis of the colors of thin plates, and the hypothesis concerning the nature and propagation of light, now known as the "corpuscular" theory, completed Newton's contributions to the science. The important services of the ingenious but eccentric Hooke cannot be easily stated in such a brief abstract, as he discovered a little of everything, completed nothing, and occupied himself to a large extent in combating faulty points in the theories of his contemporaries. It must not, however, be forgotten that he has as much right as Huyghens to the credit of originating the undulatory theory, which is the favorite one at present. The double refraction of Iceland spar was discovered (1669) by Bartholin, and fully explained in 1690 by Huyghens, the propounder of the undulatory theory, who also aided the progress of mathematical optics to a considerable extent. The velocity of light was discovered by Römer (1675), and in 1790 the aberration of the fixed stars and its cause were made known by Bradley, who likewise determined with accuracy the amount of atmospheric refraction. Bouguer, Porterfield, Euler, and Lambert rendered essential service to physical optics; the same was done for the mathematical theory by Dollond (the inventor of the achromatic telescope), Clairaut, Dalmont, Boscovich, &c.; while in later times the experi-

ments of Delaval on the colors produced by reflection and refraction; the discussion of the phenomena arising from unusual reflection or refraction, carried on by Vinco. Wollaston, Biot, Monge, and others; the discovery of polarisation of light by Malus (1808), and its investigation by Brewster, Biot, and Seebeck; of depolarisation by Arago (1811), and of the optical properties as connected with the axes of crystals (1818) by Brewster; and the explanation of these and other optical phenomena, in accordance with the undulatory hypothesis by Young—the discoverer of the *Interference* (q. v.) of rays—and Fresnel, went far to give optics a width of scope and symmetry which is possessed by few other sciences. The development of the undulatory theory and of optical science generally has been carried on in the present century by Lloyd, Airy, Cauchy, and others; and more recently important discoveries in connection with the physical modifications and chemical properties of light have been made (the latter chiefly, as far as the spectrum is concerned, by Kirchhoff), for a notice of which, and other discoveries, see PHOTOGRAPHY, SPECTRUM, and other articles.

**OPTIMISM** (Lat. *optimus*, best), the name given to the doctrine of those philosophers and divines who hold that the existing order of things, whatever may be its seeming imperfections of detail, is nevertheless, as a whole, the most perfect or the best which could have been created, or which it is possible to conceive. Some of the advocates of optimism content themselves with maintaining the absolute position, that although God was not by any means bound to create the most perfect order of things, yet the existing order is *de facto* the best; others contend, in addition, that the perfection and wisdom of Almighty God necessarily require that His creation should be the most perfect which it is possible to conceive. The philosophical discussions of which this controversy is the development are as old as philosophy itself, and form the groundwork of all the systems, physical as well as moral, whether of the Oriental or of the Greek philosophy; of Dualism, Parsism, and of the Christian Gnosticism and Manichæism in the east; and in the west, of the Ionian, the Eleatic, the Atomistic; no less than of the later and more familiar, Stoic, Peripatetic, and Platonistic Schools. In the philosophical writings of the fathers, of Origen, Clement of Alexandria, and above all of Augustine, the problem of the seeming mixture of good and evil in the world is the great subject of inquiry, and through all the subtleties of the medieval schools it continued to hold an important and prominent place. But the full development of the optimistic theory as a philosophical system was reserved for the celebrated Leibnitz, (q. v.). It forms the subject of his most elaborate work, entitled "*Theodicea*," the main thesis of which may be briefly stated to be—that among all the systems which presented themselves to the infinite intelligence of God, as possible, God selected and created, in the existing universe, the best and most perfect, physically as well as morally. The "*Theodicea*," published in 1700, was designed to meet the sceptical theories of Bayle, by shewing not only that the existence of evil, moral and physical, is not incompatible with the general perfection of the created universe, but that God, as all-wise, all-powerful, and all-perfect, has chosen out of all possible creations the best and most perfect; that had another more perfect creation been present to the divine intelligence, God's wisdom would have required of Him to select it; and that if another, even equally perfect, had been possible, there would not have been any sufficient determining motive for the creation of the present world. The details of the controversial part of the system would be out of place in this work. It will be enough to say that the existence of evil, both moral and physical, is explained as a necessary consequence of the finiteness of created beings; and it is contended that in the balance of good and evil in the existing constitution of things, the preponderance of the former is greater than in any other conceivable creation. The great argument of the optimists is the following: If the present universe be not the best that is possible, it must be either because God did not know of the (supposed) better universe, or because God was not able to create that better one, or was not willing to create it. Now every one of these hypotheses is irreconcilable with the attributes of God; the first, with His omniscience; the second, with His omnipotence; and the third, with His goodness. See Leibnitz, "*Theodicea*;" Baumeister's "*Historia del Mundo Optimo*." The view of the universe diametrically opposed to O. is Pessimism (*peccatus, worst*), and has of late been frequently maintained; see Sully's "*Pessimism*" (1877).

OPUNTIA. See PRICKLY PEAR.

O'PUS OPERA'NTIS (Lat. literally "the work of the worker"), a well-known theological phrase, intended to convey that the effect of a particular ministration or rite is primarily and directly due, not to the rite itself (*opus*), but to the dispositions of the recipient (*operans*). Thus, in the act of kissing or praying before a crucifix, of sprinkling one's self with holy water, of telling the prayers of the rosary upon blessed beads, the fervor and personal plety of the supplicant, and not the material object of the religious use, is held to be the efficient cause of the grace which is thereby imparted. The term is used chiefly by writers of the Roman Catholic schools, in whose system, however, the sacramental rites are held to differ from all others in this respect. See OPUS OPERATUM.

OPUS OPERATUM (Lat. literally "the work wrought") is the phrase employed in the Catholic theological schools to describe the manner of the supposed operation of the sacramental rites in the production of Grace (q. v.). It is intended to imply that the ministration of the rite (*opus*) is in itself, through the institution of Christ, an efficient cause of grace, and that, although its operation is not infallible, but requires and presupposes certain dispositions on the part of the recipient, yet these dispositions are but *conditiones sine qua non*, and do not of themselves produce the grace; and hence, when the sacraments are administered to dying persons in a state of apparent insensibility, this is done in the hope and on the presumption that the dying person may, though seemingly unconscious, be nevertheless really disposed to receive the sacrament; but it is by no means held that if these dispositions be wanting, the sacrament will itself justify him. It is a mistake, therefore, to suppose, as is often done in popular controversy, that Catholics ascribe to the sacramental rites such magical or talismanic power that they can sanctify even an unrepentant sinner. Their efficacious operation *presupposes as conditions* the repentance and other moral dispositions of the recipient, although the grace which they give is *due, not to these dispositions, but to the sacraments as received with the dispositions*.

OR, in Heraldry, the metal gold, represented in heraldic engravings by an undimmed number of dots.

O'RACHE (*Atriplex*), a genus of plants of the natural order *Chenopodiaceae*, having male, female, and hermaphrodite flowers; the male and hermaphrodite flowers with a 3-5-partite calyx, and 3-5 stamens; the female flowers with a compressed and 2-lobed or 2-partite calyx. The species are numerous. Some of them are of frequent occurrence in waste places, and as weeds in gardens in Britain and throughout Europe. GARDEN O. (*A. hortensis*), also called MOUNTAIN SPINACH, was formerly much cultivated in England, and is still cultivated in some parts of Europe as a substitute for spinach. It is a native of Tartary, an annual, with a stem about three feet high, and cordate-triangular leaves, which are thick and glaucous, and have a slightly acid flavor. The leaves are sometimes greenish, sometimes reddish, which is the case also in other species, and the flowers resemble the leaves in color.—The leaves of the SEA O. (*A. littoralis*), a native of the British coasts, are used in the same manner, and those of the common garden-weeds, *A. patula* and *A. angustifolia*, are excellent substitutes for spinach.—It is mentioned in Remy and Brenchley's "Journey to the Salt Lake City," that an orache, with pale pink leaves and a salt taste, is cultivated by the Indians on the Humboldt River for its seed, which resembles that of Quinoa (q. v.), and is used like it for making porridge and bread.

O'ACLE, the response delivered by a deity or supernatural being to a worshipper or inquirer; also the place where the response was delivered. These responses were supposed to be given by a certain divine afflatus, either through means of mankind, as in the oracles of the Pythia, and the dreams of the worshipper in the temples; or by its effect on certain objects, as the tinkling of the caldrons at Dodona, the rustling of the sacred laurel, the murmuring of the streams; or by the actions of sacred animals, as exemplified in the Apis or sacred bull of Memphis, and the feeding of holy chickens of the Romans. This arose, in fact, from the idea that the deity signified his intentions to men by signs or inspirations, which, however, had always to be interpreted to the inquirer by the priesthood. Such responses were, however, closely allied to augury, which differed in this respect that auguries could

be taken anywhere, while the oracular spots were denoted and limited. Oracle dates from the highest antiquity, and flourished in the most remote ages, and gradually declined with the increasing knowledge of mankind. Among the Egyptians all the temples were probably oracular, although only a few are mentioned by Herodotus, as the oracle of Latoua, in the city of Buto; those of Hercules, Mars, Thebes, and Meroe. In the hieroglyphic texts the gods speak constantly in an oracular manner, and their consultation by the Pharaohs is occasionally mentioned. In later days the most renowned of these oracles was that of Ammon, in the Oasis (q. v.), where oracular responses were rendered either by the shaking of the statue of the god, or by his appearance in a certain manner. Oracles were also used by the Hebrews, as in the consultation of the Urim and Thummim by the high priest, and the unlawful use of Teraphims, and consultations of the gods of Phœnicia and Samaria. The Hebrew oracles were by word of mouth, as the speech of God to Moses, dreams, visions, and prophetic denunciations; besides which, there were oracles in Phœnicia, as that of Belzebul and others of the Baalim. They were also in use throughout Babylonia and Chaldaea, where the responses were delivered by dreams given to the priestesses, who slept alone in the temples as concubines of the gods. So numerous were they in the ancient world, that 800 are said to have been in existence.

The most celebrated oracles of Asia Minor were those of Telesmus in Caria or Lycia, which gave responses by dreams, and that of Apollo at Patara; but the Grecian oracles enjoyed the highest reputation for truthfulness, and the most celebrated of these were the Dodonean, the Delphic, and that of Trophonius and Amphiaraus. The Dodonean (see DODONA) was the only oracle in Greece which was given by Jupiter; the others were either those of Apollo, or of certain soothsayers, to whom that god had imparted the gift of prophecy, or of other gods. The most renowned of all was the Delphic oracle (see DELPHI), and was Panhellenic or open to all Greece, consulted for public purposes, and occupying a position resembling in some respects that of the papacy in the middle ages in Europe. The name of the first priestess who gave oracles was Phemonœ. The consultations were generally in the Delphic month, *Eysios* or April, and once a day on other months; and the precedence of consulting the oracle was determined by lot, but rich presents obtained for Cræsus and the Lydians the privilege of first consultation. Sacrifices were offered by the inquirers, who walked with laurel crowns on their heads, and delivered in sealed questions; the response was deemed infallible, and was usually dictated by justice, sound sense, and reason, till the growing political importance of the shrine rendered the guardians of it fearful to offend, when they framed the answers in ambiguous terms, or allowed the influence of gold and presents to corrupt the inspirations. The other oracles of Apollo were at Aba in Phocis; at Ptoon, where a man prophesied, which was destroyed in the days of Alexander the Great; and at Ismenus, south of Thebes, Hysia, Tegyra, and Entressia. In Asia Minor the most celebrated was that of Branchidæ, close to Miletus, celebrated in Egypt, Gryneum, and Delos. Besides that of Dodona, Zeus had another at Olympia; and those of various other deities existed elsewhere. A secondary class of oracles of heroic or prophetic persons existed in Greece, the two most celebrated of which were those of Amphiaraus and Trophonius. The first mentioned was one of the five great oracles in the days of Cræsus, and was situate at Oropus, in Attica, being the shrine of a deified magician, or interpreter of dreams, having a fountain close to it. Those who consulted it, fasted a whole day, abstained from wine, sacrificed a ram to Amphiaraus, and slept on the skin in the temple, where their destiny was revealed by dreams. That of Trophonius was at Lebadea, in Bœtia, and owed its origin to a deified seer. It was given in a cave, into which the votary descended, bathed, and anointed, holding a honeyed cake. He obtained a knowledge of futurity by what he saw or heard, and returned dejected from the cavern. Then, seated upon the seat of Mnemosyne, he gave an account of what he had heard, and conducted to the chapel of Good Fortune or Good Genius, recovered his usual composure. There were some other oracles of minor importance. Besides these oracles, written ones existed of the prophecies of celebrated seers, as Bacis and Musæus, which were collected by the Pisistratidæ, and kept in the Acropolis of Athens. Those of the Enclius, Panoionus, and Lycus were also celebrated. Others of the Sibyls or prophetic women, daughters of Zeus and Lamia, were popular, and at a later period (see SIBYL),

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Athenals and others, prophesied in the days of the Seleucids. Amongst the oriental nations, as the Arabs and others, divination was and is extensively practised, but there are no set oracles. The Celtic Druids are said to have delivered responses, and the oracle of the Celtic god Belenus or Abellio, in the Isle de Sein, was celebrated. Herodot. "Hist." v. 89, viii. 82; Curtius, iv. 7; Hare, "Ancient Greeks" (12 mo. Lond. 1836, p. 141); Bos, "Antiquities of Greece" (1832, p. 31).

ORA'N (Arab. *Waran*), a thriving municipal town and seaport of Algeria, capital of the province of the same name, stands at the inner extremity of the Gulf of Oran, 220 miles west-south-west of Algiers. The province of Oran, sometimes called the province of the West, from the fact of its forming the western frontier of the country, is bounded on the n. by the Mediterranean, on the e. by the province of Algiers, on the w. by the empire of Morocco, and on the s. by the desert. Area about 100,000 sq. miles, of which 13,514 belong to the Tell (q. v.), and a large portion to the Sahara. Pop. (1872) 513,492, four-fifths of whom were Arabs. The town of O. is the seat of the government offices—the prefecture, the civil, criminal, commercial tribunals, &c. It also contains a college, primary and native schools, Protestant and other churches; synagogues; mosques; a branch of the bank of Algeria; exchequer, post, and telegraph offices; three great barracks, St Philippe, le Château-Neuf, and le Château-Vieux; a military hospital, with accommodation for 1400 beds (an immense new building, which overtops all surrounding edifices), and various splendidly appointed magazines and government stores. The town, which is girt by walls, and defended by strongly armed forts, is seated at the foot of a high mountain, crowned by the forts Santa-Cruz and Saint-Gregoire. The port does not offer safe anchorage, although it has been much improved within recent years. Large vessels, however, have still to find shelter in the roadstead of Mers-el-Kebir, three miles distant. The streets and promenades of O. are generally spacious, the houses elegant and airy. The principal edifices are the Château-Neuf, the residence of the general of division; the Hôtel de la Préfecture; the great mosque de la Rue Philippe; the Catholic church; and the barracks. Pop. of commune, comprising the three suburbs, Mers-el-Kebir, La Senia, and Aïu-el-Turk (1872) 40,674. The country in the vicinity is bare and arid, although the land is not sterile. To the south of the town the country is uncultivated, but towards the south-east highly cultivated lands are seen. In the vicinity there are a great many farms, cultivated with the greatest care, and most of them furnished with buildings necessary to their efficiency. Cattle are reared, and grain, tobacco, and cotton are grown. The vine already covers large tracts of land, and its cultivation is annually extending. It is cultivated with the most complete success, and the wines are of good quality.

Besides the commune of O., there are in the province the communes of Sidi-bel-Abbès (q. v.), of Mostaganem (pop. 11,950), of Mascara (pop. 8629), and of Tlemcen (q. v.).

The town of O. was built by the Moors. It was taken by the Spaniards in 1509, by the Turks in 1708, and again by the Spaniards in 1782. In 1791 it was destroyed by an earthquake, and shortly after it was altogether abandoned by the Spaniards. O. was taken by the French in 1831, has since remained in their hands, and has by them been developed into a large and prosperous town. Vessels with an aggregate tonnage of 65,000 tons enter and clear the port yearly. The annual imports amount to about £1,307,100, and the exports to £260,990. A bishopric was established at O. in the year 1867.

ORA'NG, or Ora'ng-Outa'ng (*Simia satyrus*, or *Pithecus satyrus*, or *P. Abellii*) a species of ape found in the forests of Malacca, Cochinchina, and some of the islands of that part of the world. The name is sometimes extended in signification, so as to include all species of the restricted genus *Simia* or *Pithecus*, a genus which exists only in the south-east of Asia and the Eastern Archipelago; and was also till of late extended even to the African apes now forming the genus *Troglodytes*, the species which is the subject of this article being distinctively called the *Ras O.*, when it and the Chimpanzee were the only *anthropoid* apes known. The name *orang* is Malayan, and signifies *man* or *rational being*; *outang* signifies *wild*, or *of the woods*. The genus *Simia* or *Pithecus* differs from *Troglodytes* (the Chimpanzee and Gorilla) in the more lengthened muzzle—the lower part of the face projecting suddenly and re-

markedly; in the very large canine teeth; in the great breadth of the central incisors; and in the great length of the arms, which are so long that the fingers can touch the ground when the animal stands erect. The ears are also small, and lie close to the head. The eyes are close together; the nose is little elevated; the lips are scarcely visible when the mouth is shut. The apes of this genus are arboreal in their habits, and not gregarious. They are ill adapted for walking on the ground, and in a wild state probably almost never assume an erect posture, and although they can be taught to do it in confinement, they maintain it with difficulty, and only when standing still; even then often seeking to adjust the balance of the body by raising the arms above and behind the head. In climbing and swinging among the branches of trees, the hands of the hinder extremities are used as readily as those of the anterior, and the great length of the arms is useful in enabling them to take hold of distant branches. The fingers of all the extremities are very long.

Some of the most important distinctions between the anatomy of the anthropoid apes and that of man, are noticed in the article CHIMPANZEE. The O. and its congeners are regarded as differing more widely from man in their anatomical characters than the chimpanzee and gorilla; although the number of ribs is the same as in man, and there are a few other particulars in which the O. more nearly resembles a human being than any of the African apes do. The projecting muzzle is much less notable in the young than in the adult O., and the aspect of the adult males is further rendered hideous by great callosities on the cheeks. In the adult state, the ridges of the skull also greatly increase in thickness and prominence.

The species of this genus exhibit in a much greater degree than those of *Troglodytes* an anatomical character common also to many other apes and monkeys, a pouch in the throat, opening from the windpipe, and capable of being dilated with air at the pleasure of the animal. In the O., it branches into several subordinate pouches, which are situated among the muscles of the throat. The use of this organ is not known. It does not appear to have any connection with the voice; and has been supposed, not very probably, to be of some service in leaping, by diminishing the specific gravity of the animal.

There are at least two other species of the genus besides that best known as the O., one of these being the great Pongo (q. v.) of Borneo (S. or *P. Wormbi*), and the other (S. or *P. morio*), also a native of Borneo, of comparatively small size. The natural history of these apes has not been thoroughly investigated; and, until recently, it was supposed that the species first known might be identical with the great ape believed to exist in the woods, and that the differences of size and other characters might depend merely on age. The O. is about three feet in length from the heel to the crown of the head. It is covered with brownish-red hair, which, on the back and arms, is five or six inches long, but very short on the backs of the hands and feet. There is little hair on the face, and none on the palms of the hands. When taken young, it is easily tamed, and becomes sufficiently familiar. It displays considerable sagacity, and some playfulness and love of mischief, but is not so frolicsome as many of the monkey tribe. Young specimens have sometimes been brought to Europe, but none have lived long. The temper is believed to change very much to the worse, when the animal reaches maturity.

ORANGE, the name of one or more species of *Citrus* (q. v.), of which the fruit is much prized. Botanists generally regard all the oranges as of one species, *Citrus aurantium*, but some follow Risso in making the Sweet O., the Bitter O., the Bergamot O., &c., distinct species. The wild state of the O. is not certainly known; although its characters may be pretty confidently inferred from the degeneration of cultivated varieties; and no cultivated plant shows a greater liability to degenerate, so that seedling oranges are almost always worthless. Nor is its native country more certain, although there is much reason to believe that all the kinds have spread over the world from the warmer central and eastern parts of Asia. It has been alleged that the O. is a native of North America, near the Gulf of Mexico; but the probability rather seems to be that it has been introduced, and has become naturalized.

The COMMON O., or SWEET O. (*Citrus aurantium* of Risso), is an evergreen tree of moderate size, with greenish-brown bark; the leaves oblong, acute, sometimes minutely serrated, the leaf-stalks more or less winged, the flowers white, the fruit roundish, the oil-cysts of the rind convex, the juice sweet and acid. It is cultivated



in almost every part of the world of which the climate is warm enough, but succeeds best in the warmer temperate or sub-tropical climates, as in the south of Europe, where it is very extensively cultivated, as far north as the south of France. The O. does not seem to have been known to the Greeks or Romans, but was probably brought to Europe by the Moors, and is supposed to have been introduced into Italy so recently as the 14th c., fully 1000 years after the citron. In the north of Italy, oranges are sometimes grown in conservatories, but often in the open air, except during winter, when they are covered with temporary houses of boards. In the south of England, they are sometimes in like manner grown in the open air, with a shelter of boards or matting in winter, but trained against a south wall; attaining a large size, and yielding good fruit. The abundant importation of the fruit, however, renders the cultivation of the O. in Britain unnecessary; and, in general, only small plants are to be seen in green-houses or conservatories, as mere objects of interest. In former times, when the evergreen shrubs in cultivation were much fewer than now, O. trees were very commonly cultivated in pots, both in green-houses and in windows of apartments in Britain, as is still the case in the northern parts of Germany. The O. loves a rich soil, and succeeds well in a strong clay. There are many varieties in cultivation, which are perpetuated by grafting upon seedling O. stocks, and by layers.

Of the varieties of the Sweet O., perhaps the most deserving of notice are the PORTUGAL or LISBON O., the most common of all, having the fruit generally round or nearly so, and a thick rind; the CHINA O., said to have been brought by the Portuguese from China, and now much cultivated in the south of Europe, having a smooth thin rind and very abundant juice; the MALTESE or BLOOD O., remarkable for the blood-red color of its pulp; the Egg O., having fruit of an oval shape; and the TANGERINE O., having a small flat fruit, with a pleasant odor and finely flavored pulp. The ST MICHAEL'S O. appears to be a subvariety of the China Orange. The MAJORCA O. is seedless, resembling in this certain cultivated varieties of other fruits.

The BITTER O., SEVILLE O., or BIGARADE (*Citrus vulgaris*, or *C. bigaradia*), is distinguished from the Sweet O. by the more truly elliptical leaves, the acid and bitter juice of the fruit, and the concave oil-cysts of its rind. Its branches are also spiny, which is rarely the case with the Sweet Orange. The varieties in cultivation are numerous. The Bitter O. was extensively cultivated by the Moors in Spain, probably for medicinal purposes. The rind is more bitter than that of the Sweet O., and is used as a stomachic and tonic. Its chief use, however, is for flavoring puddings, cakes, &c., and for making marmalade.

The BERGAMOT O. (*C. Bergamia*) is noticed in a separate article.

The MANDARIN O., or CLOVE O. (*C. nobilis*), recently introduced from China, has fruit much broader than long, with a thick rind, very loosely attached to the flesh, so that there is often a space between them. The leaves are smaller than those of any other kind of orange.

O. leaves are feebly bitter, and contain a fragrant volatile oil, which is obtained by distilling them with water, and is known in the shops as *Essence de Petit Grain*. O. flowers yield, when distilled with water, a fragrant volatile oil, called *Oil of Neroli*, which is used in making *Eau de Cologne*, and for other purposes of perfumery. The flowers both of the Sweet O. and of the Bitter O. yield it, but those of the Bitter O. are preferred. Dried O. flowers, to be distilled for this oil, are an article of export from the south of Europe. They are packed in barrels, and mixed with salt. The dried flowers have a yellowish color; the fresh flowers are white and very fragrant. The use of them as an ornament in the head-dress of brides is common throughout great part of the world.—The small green oranges, from the size of a pea to the size of a cherry, which fall from the trees, both of the Sweet O. and the Bitter O., when the crop is too great to be brought to maturity, are carefully gathered and dried, and are the O. berries of the shops. They are used in making Curacao. They also yield a fragrant oil on distillation, the original *essence de petit grain*; and they are smoothed in a turning-lathe, and employed as *issue pease*; not readily acquiring a fetid odor, as pease do when employed for this purpose.—The dried and caudled rind of the ripe Bitter O., well known as *Orange-peel*, is used as a stomachic, and very largely for flavoring puddings and articles of confectionary. The rind of the Sweet O. is sometimes employed in the same way, but is inferior. A fragrant

essential oil is obtained from the rind of the O. by distillation with water, and is sold by perfumers as *Oil of Sweet O.*, or *Oil of Bitter O.*, according as it is obtained from the one or the other, although the two kinds of oil are very similar. The rind of the O. is used in the preparation of a fine liqueur called *O. Rosoglio*, which is an article of export from some parts of Italy. Besides the use of the Sweet O. as a dessert fruit, and as a refrigerant in cases of sickness, its juice is extensively used as a refrigerant beverage, and is particularly valuable in febrile and inflammatory complaints.

O. trees are often extremely fruitful, so that a tree twenty feet high, and occupying a space of little more than twelve feet in diameter, sometimes yields from 3000 to 4000 oranges in a year. The O. tree attains an age of at least 100 to 150 years. Young trees are less productive than old ones, and the fruit is also less juicy, has a thicker rind, and more numerous seeds.

The wood of the O. tree is yellowish white and close-grained. It is used for inlaying and for turnery.

The fruit of the O. tree is of great commercial importance, for not only is it one of the most delicious and wholesome of fruits, but fortunately it is also the most easily kept and carried from place to place. No fresh fruit possesses in the same degree as the O., and its congeners, the lemon, citron, lime, &c., the property of being easily packed in boxes, when nearly ripe, and being in that state able to stand the close confinement of a ship's hold during a voyage of two or three weeks. The O. is much cultivated in the Azores, Malta, Sicily, Spain, and Portugal, and it is from these localities that Britain receives its supply. Those from St Michael's, one of the Azores, and from Malta, are the best varieties in our markets; but the *Mandarin* O. of China and the Navel O. of South America are much superior. The latter occasionally reach this country in small quantities from Brazil; they are nearly double the size of the ordinary O., and have a peculiar navel-like formation on the top of the fruit, which is somewhat oval in shape. The very small O., now often seen in our shops, with an extremely aromatic rind, is the Tangerine O., of which there are two varieties—the greater and lesser. The latter is hardly an inch in diameter, but the flesh is sweet, and the rind deliciously fragrant. The larger variety is about half the size of a common O., and is the one generally seen.

The Bitter O. is called the Seville O. in consequence of large plantations, which the Moors planted round the city of Seville, having for a long time furnished the chief part of those used in this country; but it also has several varieties, which are all remarkable for the bitterness of the rind, and the not very pleasant sharpness of the juice. Their chief use is for making the well-known confection called Orange Marmalade, and for this the true *Large-fruited* variety is the best, but it is now somewhat scarce.

Oranger, when gathered for export, must not be quite ripe; those fully formed, and with the color just turning from green to yellow, are chosen. Each is wrapped in a piece of paper, or in the husk of Indian corn, and they are packed in boxes and half-boxes, chests and half-chests—the former are the Sicilian packages, the latter are St Michael's, Spanish, and Portuguese. A box contains about 250, a chest about 1000 oranges; and the price ranges from 15s. to 30s. per box, and from 30s. to 50s. a chest. The crop begins to arrive early in November, and the ships continue to bring them until the spring. The quantity consumed in Great Britain alone is enormous; and since the duty was removed, has reached nearly two millions of bushels annually.

Orange-peel, or the rind of the O., is used both in medicine and in confectionary—for the former purpose, it is merely cut into long strips, and dried; for the latter, it is carefully separated, either in halves or quarters, from the fruit, and after lying in salt water for a time, is washed in clear water, and then boiled in syrup of sugar, or candied, and is sold extensively as candied peel. The rinds of the citron and lemon are treated in the same manner.

ORANGE (the ancient *Araucario*), an ill-built, decaying, and dirty, but also an interesting town of France, in the department of Vaucluse, stands in a beautiful plain on the left bank of the Aigue, 16 miles by railway north of Avignon. Its chief manufactures are silks, muslins, serges, &c.; and there are numerous oilworks, dye-works, and tanneries. It carries on a considerable trade in wine, spirits, oils, truffes, saffron, honey, madder, and essences. Pop. (1872) 6290.

Orange  
Orangeman

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O. was the capital of a small independent principality of the same name (now comprised in the department of Vaucluse), which was ruled by its own sovereigns from the 11th to the 16th century. The last of these sovereigns, Philibert de Chalus, died in 1531, without issue. His sister, however, had married a Count of Nassau, and to that House the estates and titles passed. The Count of Nassau who obtained the principality of O. was William, the father of William I., the Stadtholder of the United Provinces (see WILLIAM, PRINCE OF O.). William III., Prince of Orange and king of England, having died in 1702 without issue, there began a long-continued controversy as to the succession between Frederick I. of Prussia (as grandson of one of the last princes of O.), the representative of the older branch of the house of Nassau (q. v.), and the head of the younger line. At the peace of Utrecht (1713) the king of Prussia took the settlement into his own hands, so far as the territory of O. was concerned, by making it over, for certain equivalents, to the king of France. The title, Prince of O., remained with the younger Nassau line, afterwards kings of the Netherlands, and is now borne by the heir-presumptive to the Dutch throne.

In the vicinity of O. are several notable Roman remains. The triumphal arch, 60 feet high, is celebrated for the beauty of its architecture, and for its richly sculptured *bas-reliefs*. Of the theatre, the remains are sufficiently entire to give a good idea of the arrangements of this institution as it existed among the Romans.

ORANGE, a township in New Jersey, U. S., four miles north-west of Newark, containing three villages, Orange, North Orange, and South Orange. Orange Mountain commands a noble view of New York City and Bay, and its slope is laid out in beautiful parks, and ornamented with villas. It is the site of a Roman Catholic College and a Water-cure establishment. Pop. in 1870, 9348; 1890, 12,307.

ORANGE COLORS, for painters' use, are various shades of alteration produced on chrome yellow (see YELLOW), by acting on it either with diacetate of lead or a weak alkaline lye, both of which redden the otherwise pure yellow, and give it an orange tint.—For dyers, a beautiful orange red is obtained from safflower; and orange yellows are made by mixing, in proper proportions, any of the red with the yellow dyes.

ORANGE RIVER. See GARIEP.

ORANGE RIVER FREE STATE. The Orange River Free State is the name assumed by the republic of Dutch boers, who, after retiring from Natal when declared a British colony, established themselves in the country lying between the two great branches of the Orange River, the Ky Gariep and the Gariep, known to the colonists as the Vaal and Orange Rivers, and separated from the coast region by the great chain of the Quathlamba, Maluti, and Drachenberg mountains.

The Orange River Free State forms a sort of connecting-link between the Cape Colony, the Transvaal Territory, and Natal. It consists chiefly of vast undulating plains, which slope down from the Maluti Mountains to the Vaal River, dotted over here and there with rocky hills, locally called "Kopjes," although in the northern part hundreds of square miles are found with hardly a break on the horizon. It comprises an area of above 50,000 square miles.

When the emigrant Dutch boers took possession of this country, it was inhabited by different tribes of Bejouanas and Corannas, all of whom have been dispersed, except the powerful Basuto tribe, under the chief Moshesh, who still maintain themselves in the fastnesses of the Maluti Mountains, and a few Batclapi and other Bejouanas, who dwell round the Wesleyan mission station of Thab' Unchu and Mers-metsu.

All the rivers of this region are affluents of either of the branches of the Gariep; amongst them may be named the Modder, Valsch, Great and Little Vet, which run into the Ky Gariep or Vaal River, and the Caledon, a considerable stream, which joins the Orange River after draining the Basuto country.

This region is a vast plateau, rising from 8000 to 5000 feet above the sea-level, with very little wood, except along the lines of the water-courses that traverse it. Travellers crossing this state from the Cape Colony to Natal arrive at the top of the passes leading to the latter colony without a mountain being in sight, and then find themselves suddenly on the edge of an immense mountain-chain, with the coast region several thousand feet below them, extending to the Indian Ocean. Immense herds of the larger antelopes formerly tenanted these vast plains, and are vividly

described by Captain Harris, Gordon Cumming, and others; they are now fast disappearing. The diamond-fields recently discovered lie in this state, and in Griqua Land, a narrow strip of territory bounding it on the west.

The Free State is divided into the following districts: Bloem Fontein (chief town, Bloem Fontein the capital, Boshof); Winburg (chief town, Winburg, Cronstadt); Smithfield (chief town, Smithfield); Harrismith (chief town, Harrismith); Fauresmith (chief town, Fauresmith). The chief town Bloem Fontein is situated about 150 miles north-west of Olesberg, on a tributary of the Modder River, in lat. 29° 8' s. It contains about 250 houses; a Dutch, Episcopal, and Roman Catholic Church; has two local banks, and is the seat of an Episcopal see of the Church of England. It is distant about 800 miles overland from Cape Town, and has a post twice a week with it. The other villages or small towns are all increasing and flourishing, but do not present anything remarkable.

By the latest returns (1866) the population of the Free State was 37,000 whites, of whom about 2000 were English. In 1875-1876, the revenue, principally derived from local taxation and quit-rents of farms, was £103,091.

The history of the country forming the Free State may be summed up in a few words. Captain Harris describes it, before 1836, as a howling wilderness, inhabited by wandering hordes of Bushmen and broken tribes of Bejounna and Zulu refugees from the armies of the great Zulu tyrants, Chaka, Dingaan, and Maselikutse. After the Kaffir war of 1835-1836, a spirit of dissatisfaction arising in the minds of many of the frontier boers, an extensive emigration took place along the north-east frontier of the Cape Colony; the majority of the emigrants, however, having Natal as their ultimate goal. However, after the British government had declared it an English colony in 1843, the boers again fell back on this region, and by degrees declaring their independence of the British crown, and forming a sort of Abatia on our very borders, after some opposition, and one or two conflicts with our troops, the country was annexed by Sir H. Smith to the British empire, under the name of the Orange River Sovereignty; and continued so until 1854, when Sir G. Clerk formally gave it up, and allowed the inhabitants to form a government according to their own wishes. The government is now in the hands of a president, freely elected by the landroet and heemraden in the several districts; while the volksraad, or people's council, exercise legislative functions. This state labors under the very serious disadvantage of being, like the kingdom of Bohemia, entirely inland, and has no port on the ocean at which customs dues can be collected; thus throwing the whole of the expense of government on local taxation.

About the year 1862, a large number of Griquas—a tribe of Bastard Hottentots, who inhabited the south part of the state—sold their farms to the Free State government, and migrated in a body to the coast side of the mountains in Independent Kaffraria, occupying a large tract of country there known by the name of No Man's Land.

In 1866, a treaty was concluded with Mosheah, chief of the Basutos, by which a portion of the territory known as Basuto Land was ceded to the O. R. F. S. The boundaries agreed on by this treaty were, however, somewhat modified by the governor of Cape Colony in 1869—a significant fact.

The Dutch boers profess the Dutch Reformed faith, and speak a dialect of Dutch, corrupted with Hottentot and English words. They marry young, and keep up, to some extent, nomadic habits. The roads and internal communication are good. Lime and timber are rather scarce, but building stone and thatch abundant. Woolled sheep have increased amazingly within the last few years; and farms that ten years ago would hardly fetch £50, now sell at from £2000 to £3000. The value of imports in 1875 was £697,025; of exports, £1,530,883.

O'RANGEMAN, one of the unhappy party designations which contributed for nearly a century to create and keep alive religious and political divisions of the worst character throughout the British empire, but especially in Ireland. The Orange organization had its origin in the animosities which had subsisted between Protestants and Catholics in Ireland from the Reformation downwards, but which reached their full development after the Revolution of 1690, and the wholesale confiscations of Catholic property by which that event was followed. From that time, the Catholics of Ireland may be said legally to have lost all social, political, and religious status in Ireland. Some attempts which were made in the latter part of the 18th c. to ameliorate their

condition, excited, especially in the north, the alarm of the Protestant party, who regarded the traditional "Protestant ascendancy" as endangered. Acts of violence became of frequent occurrence, and, as commonly happens, combinations for aggressive and defensive purposes were formed, not alone by the Protestants, but also by their Catholic antagonists. The members of the Protestant associations appear at first to have been known by the name of "Peep-of-day Boys," from the time at which their violence was commonly perpetrated; the Catholics who associated together for self-defence being called "Defenders." Collisions between armed bodies of these parties became of frequent occurrence. In 1785, a pitched battle, attended with much bloodshed, was fought in the county of Armagh. The steps taken to repress these disorders were at once insufficient in themselves to prevent open violence, and had the effect of diverting the current into the still more dangerous channel of secret associations. The rude and illiterate mob of Peep-of-day Boys made way for the rich and influential organisation of the Orange Society, which, having its first origin in the same obscure district which had so long been the scene of agrarian violence, by degrees extended its ramifications into every portion of the British empire, and into every grade of society from the hovel to the very steps of the throne. The name of the Orange association is taken from that of the Prince of Orange, William III., and was assumed in honor of that prince, who, in Ireland, has been popularly identified with the establishment of that Protestant ascendancy which it was the object of the Orange association to sustain. The first "Orange Lodge" was founded in the village of Loughgall, county Armagh, September 21, 1795. The immediate occasion of the crisis was a series of outrages by which Catholics were forcibly ejected from their houses and farms, 12 or 14 houses being sometimes, according to a disinterested witness, wrecked in a single night; terminating, September 1796, in an engagement, called from the place where it occurred, the Battle of the Diamond. The association which began among the ignorant peasantry soon worked its way upwards. The general disaffection towards English rule, which at that time pervaded Ireland, and in which the Catholics, as a natural consequence of their oppressed condition, largely participated, tended much to identify in the mind of Protestants the cause of disloyalty with that of popery; and the rebellion of 1798 inseparably combined the religious with the political antipathies. In November of that year, the Orange Society had already reached the dignity of a grand lodge of Ireland, with a grand master, a grand secretary, and a formal establishment in the metropolis; and in the following years, the organisation extended over the entire province of Ulster, and had its ramifications in all the centres of Protestantism in the other provinces of Ireland. In 1803, it extended to England. A grand lodge was founded at Manchester, from which warrants were issued for the entire kingdom. The seat of the grand lodge was transferred to London in 1821. The subject more than once was brought under the notice of parliament, especially in 1813; and, in consequence, the grand lodge of Ireland was dissolved; but its functions in issuing warrants, &c., were discharged vicariously through the English lodge. The most memorable crisis, however, in the history of the Orange Society was the election of a royal duke (Cumberland) in 1827 as grand master for England; and on the re-establishment of the Irish grand lodge in 1828 as imperial grand master. The Catholic Relief Act of the following year stirred up all the slumbering antipathies of creed and race, and the Orange association was propagated more vigorously than ever. Embassadors were sent out for the purpose of organising lodges, not alone in Wales and Scotland, but also in Canada, in the Mediterranean, and in the other colonies. But the most formidable part of this zealous propagandism was its introduction into the army. As early as 1824, traces of this are discoverable, and again in 1826. No fewer than 53 regiments were proved to have received warrants for holding lodges in Ireland, and the English grand lodge had issued 87 warrants for the same purpose.

The organisation of this strange association was most complete and most extensive. Subject to the central grand lodge, were three classes—county, district, and private lodges—each of which corresponded, and made returns and contributions to its own immediate superior, by whom they were transmitted to the grand lodge. Each lodge had a master, deputy-master, secretary, committee, and chaplain. The only condition of membership was, that the party should be Protestant, and 18 years of age. The election of members was by ballot, and each lodge also annually

elected its own officers and committee. The general government of the association was vested in the grand lodge, which consisted of all the great dignitaries, the grand masters of counties, and the members of another body called the grand committee. This lodge met twice each year, in May and on November 5—the day pregnant with associations calculated to keep alive the Protestant antipathies of the body. All the dignitaries of the society, as well as its various committees and executive bodies, were subject to annual re-election. In 1835, the association numbered 20 grand lodges, 80 district lodges, 1500 private lodges, and from 200,000 to 220,000 members. The worst result of the Orange Association was the constant incentive it supplied to party animosities and deeds of violence. The spirit of fraternity which pervaded its members was a standing obstacle to the administration of the law; and all confidence in the local administration of justice by magistrates was destroyed. An alleged Orange conspiracy to alter the succession to the crown in favor of the Duke of Cumberland, led to a protracted parliamentary inquiry in 1835; and this inquiry, as well as a shocking outrage perpetrated soon afterwards by an armed body of Orangemen, on occasion of a procession in Ireland, so discredited the association, and awakened the public mind to a sense of its folly and wickedness, that its respectability has since that time gradually diminished. For several years the Lord Chancellor laid down a rule, by which no member of the Orange Association was admitted to the commission of the peace; and the association became comparatively without influence, except among the very lowest classes in the north of Ireland. Of the colonial offshoots of the Orange Association, those of Canada have at all times been the most active, carrying with them all the bitterness of the domestic feud with the Roman Catholics. Outrages against Catholic churches and convents were of not unfrequent occurrence until recently; and on occasion of the visit of the Prince of Wales to Canada, an attempt was made to force from his Royal Highness a recognition of the association, which was only defeated by his own firmness, and by the judicious and moderate counsels of his advisers. In 1861 the Orange Association of the United States had in connection with it 1200 lodges, and about 150,000 members.—See "Reports on the Orange Association," presented to parliament in 1835.

The Orange Association in Ireland, which had begun to fall into general disrepute, received an impulse among the working-classes from a series of sanguinary conflicts with Roman Catholics on occasion of the anniversary celebrations of the society; and even still, the peace of many districts in the north of Ireland is only preserved on such occasions by the presence of an overpowering force of military and constabulary. The repeal of the Processions Act has failed, up to the present time, to put an end to the traditional collisions of the parties.

**ORATORIO** (Ital. *oratorio*, chapel or oratory, the place where these compositions were first performed), a kind of sacred musical composition, either purely dramatic or partaking both of the drama and the epic, in which the text is illustrative of some religious subject, sometimes taken directly from Scripture; and the music consists of recitatives, airs, duets, trios, quartets, choruses, accompanied by an orchestra, sometimes also by an organ, and introduced by an instrumental overture. The oratorio is not intended for scenic representation.

St Filippo Neri, born in 1515, has been considered the founder of the oratorio. He engaged poets and composers to produce dialogues, on subjects from scriptural and legendary history, in verse and set to music, which were performed in his chapel or oratory on Sundays and church festivals. The subjects were "Job and his Friends," "The Prodigal Son," "The Angel Gabriel with the Virgin," and "The Mystery of the Incarnation." Stradella composed various oratorios, of which "San Giovanni Battista," produced in 1670, is praised by Dr Burney. A number of oratorios, or *azioni sacre*, by Apostolo Zeno and Metastasio, were set to music by Caldara in the beginning of last century. Sebastian Bach's "Passions-Musik" was a species of oratorio, originally performed during the service of the church, the congregation joining in the chorales. Its form arose out of the practice prevalent in the Lutheran Church, of having the gospels for the day repeated on Good Friday, and some other festivals, by different persons in a recitative and dialogue style. By far the greatest master of oratorio was Handel, who perfected that species of composition, and was the first to introduce it into England. At the age of 20, when on a visit to Italy, he produced his oratorio of "La Resurrezione" at Rome. "Euthor" the first oratorio written by him in Eng-

laud, was composed for the chapel of his patron, the Duke of Chandos, in 1730, the words altered from Racine. It was performed privately at Cannons in the same year, but laid aside, and not produced in public till 1732. An oratorio was then so complete a novelty in England, that it was deemed necessary to give the following explanation in advertising it: "By His Majesty's command, at the King's Theatre in the Haymarket, on Tuesday, the 2d May, will be performed the sacred Story of Esther, an oratorio in English, composed by Mr Handel, and to be performed by a great number of voices and instruments.—N. B.—There will be no acting on the stage, but the house will be fitted up in a decent manner for the audience." For many years after the appearance of "Esther," no more oratorios were produced by Handel, who devoted himself to operas and other secular music; and it was only after the temporary failure of his health, that at the ripe age of 58 he resumed the composition of oratorios. The great oratorios which have made his name immortal were all produced in the decline of life, some of them after he was afflicted with blindness, and they were performed for the most part in the old Haymarket Theatre. "Deborah" was first performed in 1733; "Athaliah," in 1734; "Israel in Egypt," in 1739; "The Messiah," in 1741; "Samson," in 1742; "Judas Maccabeus," in 1746; "Joshua," in 1747; "Solomon," in 1749; and "Jephtha," in 1751. The two crowning works were "Israel in Egypt" and "The Messiah"—the former ranks highest of all compositions of the oratorio class. "The Messiah"—which, in consequence of its text being taken entirely from Scripture, was called by Handel "The Sacred Oratorio"—ranks very near it in point of musical merit, and has attained an even more universal popularity; from the time when it was first brought out, down to the present day, it has been performed for the benefit of nearly every important charitable institution in Britain. "Judas Maccabeus" is perhaps best known from the flowing and martial grace of that unrivalled military march. "See the Conquering Hero Comes;" and "Saul" is associated in every one's mind with the most solemn of all funeral marches. The orchestra was but imperfectly developed in Handel's time, and his oratorios had therefore originally but meagre instrumental accompaniments; they have since been generally performed with additional accompaniments written by Mozart. From Handel's time downwards, it was the practice in London to have oratorios performed twice a week during Lent in the various theatres, which were only given up on the institution of the oratorio performances at Exeter Hall. Haydn composed three oratorios—"The Return of Tobias," "The Seven Last Words," and "The Creation." "The Seven Last Words," a work full of sweetness and of energy, hardly answers to the common conditions of an oratorio; it is rather a series of symphonies, intended to follow as many short sermons on the sentences uttered by our Lord on the cross, the text being a subsequent addition by the composer's brother, Michael Haydn. "The Creation" originated in a visit of Haydn to London, in 1791, when he heard for the first time some of the works of Handel, none of which were then known in Germany. Though less grand than the oratorios of Handel, it is full of fresh lovely songs, bright choruses, picturesque recitatives, and exquisite instrumentation. Beethoven's sole oratorio, "The Mount of Olives," is a pure drama, rather than the mixed composition generally known under the name. Spohr's "Last Judgment, produced in 1825, contains some grand music, particularly in the choruses. Coeta's "Eli" deserves mention among modern oratorios. But since the time of Handel no other writer of oratorios has approached Mendelssohn. The greatest works of that composer are his oratorios of "St Paul" and "Elijah"; the former was first produced at Düsseldorf in 1836, the latter at Birmingham in 1846; and at the time of his death he was engaged in a third oratorio, called "Christus," which he expected would be his greatest, and of which but a few fragments have been published. The oratorios of Mendelssohn have tended greatly to revive the popularity of this kind of composition in Britain. At Exeter Hall in London, and at the musical festivals throughout England, oratorios are performed on a large scale, and with a power, a precision, and a perfection unknown elsewhere. The choruses at the provincial festivals are, for the most part, supplied by Birmingham, Manchester, Leeds, and the other large towns. The greatest oratorio performances are now those of the Triennial Festivals at the Sydenham Crystal Palace. At the festival of 1874, the chorus amounted to 2972 voices, and there was an orchestra of 455 performers.

**ORATORIUM** (Lat "oratory," called in Greek *ekklesion* or *proseukterion*), as contradistinguished from *ecclesia*, "a church," is the name given to an apartment or building designed for worship of a private or domestic character. From the earliest times, the use of oratorio is traceable in the history of the church; and before the regular organisation of parishes, they had probably a considerable place in the common, although not in the public worship. At a later period, oratorio became a common appendage of the castles and residences of the nobility, and were of two kinds; the first, simply for private or family prayer and other devotion; the second, for the celebration of mass. The latter fell properly under the jurisdiction of the bishop or the parochial clergy, and many jealousies and disputes grew out of their establishment or direction. The Council of Trent (Sess. xxii., "De Reformatione") placed them under very stringent regulations, which have been enforced and developed by later popes, especially by Benedict XIV.

**O'RATORY**, Congregation of the. The origin of this learned Congregation, and its early history, have been detailed under the head of **ST PHILIP NERI** (q. v.). It is remarkable, however, that this extraordinary man, unlike most other founders of religious bodies in the Roman Catholic Church, had never committed to writing any definite body of rules for the government and direction of the brethren. Even his scattered papers, from which his plans and intentions might have been collected, had been burned by his orders a short time before his death. Soon after that event, the Fathers, at the instance of Baronius, compiled from the existing practices and from memory a rule for the Congregation, framed so as to embody the spirit of St Philip. This rule was approved of by Paul V. on February 21, 1612. The Fathers of the Congregation are a body of priests living in community, but without vows, and under a constitution of a highly democratical character. They are at liberty to withdraw at any time, and to resume possession of the property which they had brought with them at entrance; and even during their association, each member manages his own financial concerns, only contributing a fixed sum to the common expenses of the community. There is no superior-general, as in other orders. Each house is distinct and independent. In each, the superior is elected only for three years, and his position does not give him any personal pre-eminence whatever. The members take their places according to seniority, not according to official rank, and the superior is compelled to take his turn in all the duties, even down to the semi-menial office of serving in the refectory. The main occupations of the Fathers, beyond those of attending to the public service of the church, and the duties of the pulpit and the confessional, lie in the cultivation of theological and other sacred studies, of which "conferences" for the discussion, in common, of theological questions, form a principal feature. The Congregation has produced many men of great eminence in sacred science, among whom have been already named the great church historian, Cardinal Baronius, and his continuators. To these may be added the celebrated explorers of the Roman catacombs, Bosio, Severani, and Aringhi; and the no less eminent patristical scholar, Gallandi. The houses of the Oratory in Italy before the Revolution were numerous, and in high repute. Few towns of any importance were without a house of the Oratory. The Congregation was early established in France by the celebrated Pierre (afterwards Cardinal) de Berulle, in common with two Italian Fathers, and from France it extended to the Low Countries. One important difference, however, is noticeable between the French Oratory and the Roman original. In the former, all the houses of the country are subject to a single superior-general. In France, also, the Oratorians took charge of seminaries and of theological teaching. The French Oratory, as well as the Italian, reckons many illustrious members; but the fame and utility of the French Congregation were much marred by the unhappy controversy about Jansenism. In the year 1847, this Congregation was introduced into England by Dr John Henry Newman (q. v.). Soon after his secession from Anglicanism, he established a house, the members of which were for the most part ex-Anglicans like himself, near, and finally at Birmingham; and soon afterwards, a second at London, which has since been transferred to Brompton.

**O'RBI8 PICTUS** (the *Pictured World*), the title of the first picture-book or illustrated manual of instruction for the young, by the celebrated educationist, Comenius, published at Nürnberg in 1657. It was long a great favorite with the youth of Germany, and continued to be reprinted, in various modified forms, down to recent



times. Comenius, with the instinct of a great teacher, felt that to give words without things to the pupil was not simply to retard his progress, but to lay the foundation of vague and inaccurate conceptions. Hence his introduction of the picture of things into the work above named, which, among other things, was intended for those beginning the study of Latin, the connecting of the word with the picture tending to give the pupil a firmer hold or a quicker perception of both word and thing. The great and distinguishing merit of Comenius's book is, that it brought distinctly into notice the necessity of giving children in the earliest stages of their education, not simply a word, but the form of the thing of which the word was the symbol. A further advance on this idea was made by Pestalozzi, who aimed at presenting to the eye of the child the thing itself, whenever it was practicable to do so; and he regarded this as essential to the right education of the human faculties in their infancy. From this, again, flowed the excellent custom of giving Object Lessons in Infant Schools.

**O'RBIT**, in Astronomy, is the path described in space by a heavenly body in its revolution round its primary.\* The path so described is of an elliptic form, and would be accurately an ellipse, were it not for the disturbing influence of the other heavenly bodies. See **PERTURBATIONS**. The complete determination of a planet's orbit is of the last importance to astronomers, as it enables them to predict the planet's place in the heavens at any period, and thus determine the exact date of eclipses of the sun and moon, of transits and occultations of the planets, and of the appearances and disappearances of comets. For the determination of a planet's orbit, it is necessary to know three things: 1. The situation of the *plane* of the orbit in space; 2. The position of the orbit in this plane; and 3. The situation at a given epoch, and rate of motion, of the planet in its orbit. Since the plane of the ecliptic is for convenience taken as the reference plane, the position of the plane of a planet's orbit is known when its inclination to the plane of the ecliptic (1), and the line of intersection of the two planes (2), are known. Since the sun, which is the focus of the planetary orbits, lies in this line of intersection, the orbit cannot lie wholly above or below the plane of the ecliptic, but must cut it in two points called *Nodes* (q. v.), and the position of the line of intersection, or line of nodes, is generally given in terms of the longitude (or angular distance) of the ascending node, reckoning from the equinox. The situation of a planet's orbit in its plane is determined when we know its form (3), size (4), and the position of its major axis or line of apsides (5). The size and form of the orbit depend upon the length of its major and minor axes, but astronomers prefer to employ the major axis and eccentricity (see **ELLIPSE**); and the position of the major axis is known by determining the heliocentric longitude of its *perihelion* (i. e., the extremity of it which is nearest the sun). To complete our knowledge of a planet's motion, all we now require are the epoch of its appearance at some determinate point of its orbit, say, at the perihelion (6), and the velocity of its motion in its orbit (7), for when this last is known, the law of areas, as given in Kepler's second law, enables us to determine the position of the planet in its orbit at any future period. These seven facts, the possession of which gives us a complete clue to a planet's motion, are called the seven "elements of a planet's orbit." What has been here stated concerning the planetary orbits, is equally true of the orbits of the comets and satellites, though, in the case of the latter, the effect of disturbing forces is so great as to produce a considerable change of the elements in one revolution.

**O'RDHARD** (Goth. *aurtigards*, Middle High Ger. *wurzgarte*, Ang.-Sax. *vyrtgeard*, *ortgeard*, a yard or garden for worts or vegetables), a piece of ground especially devoted to the growth of fruit-trees, and in which these are planted as near to each other as their profitable cultivation will admit of, no space being left for collinary vegetables, as in the fruit-garden. The introduction of such crops to any considerable extent is injurious to the trees of an orchard, by exhausting the soil, and the vegetables produced are not good. In some orchards, the soil is regularly digged, and manure pretty freely supplied, the trees being *dwarf standards*, trained to a low and bushy form, in rows about twelve feet apart, with rows of gooseberries, currants, or rasp-

\* The sun is the primary of the planets and comets, and each planet is the primary of its satellites (secondary planets).

berries between them. Such orchards are often very productive, and are not liable to suffer much from winds, whilst the trees also protect each other from frosts in spring. Other orchards are formed in old pastures, the turf being replaced when the trees are planted, or, if they are formed on land that has been under the plough, it is sown down with grass. In these, also, manure is occasionally given. In many cases, the grass of orchards is employed for pasturing cattle or sheep, the trees being standards or half-standards, with stems so tall that their branches are beyond the reach of the animals, and in this way the grass produced by the soil is returned to it in the form of manure. In forming orchards of this kind, it is not unusual to plant the *stocks*, upon which the proper grafts or buds are afterwards inserted. Great orchards of this kind exist in Devonshire, Herefordshire, and some other southern counties of England, devoted to the growth of apples for the production of cider, and to a smaller extent, of pears for the production of perry. Orchards are not so common in Scotland as in England, where they are not only frequent appendages of the manor-house, but even of the farm-house. Apples, pears, plums, and cherries, not of the finest kinds, are the fruits chiefly produced in British orchards, although some in England also yield walnuts, chestnuts, medlars, mulberries, quinces, &c., and there are even a few small fig-orchards in the most southern parts. Fig and peach orchards are very common in the more southern parts of Europe; and oranges, lemons, &c., on the shores of the Mediterranean.

An orchard requires a dry soil, which ought also to be free and open, not a stubborn clay. A gentle slope, exposing it to the sun, is preferable to perfectly level ground. Protection from prevalent winds, especially in Britain from the south-west winds which often blow strongly in autumn, is very necessary; but it is not less important that there should be a free circulation of air, in default of which the trees become covered with lichens and mosses, and cease to be productive. An orchard is often surrounded by a hawthorn-hedge, but a small orchard must not have a very high hedge. Forest trees are often planted as a screen, but must not be too near. Where walnut and chestnut trees will ripen their fruit, they are often planted, on the side most exposed to winds, for shelter.

In laying out the ground for an orchard, it is not unusual to form it into ridges, on the crown of which the trees are planted. But, however this may be, the trees are planted in rows running north and south, so that the rays of the sun may penetrate among them somewhat equally. In planting the trees, their roots are spread out as much as possible, as it is found desirable to encourage them to extend near the surface, rather than to penetrate deep into the ground, particularly where no digging or cropping is intended. The remarks on soil and manures in the article **FRUIT-GARDEN** are applicable also to orchards.

The districts of Scotland most celebrated for their orchards are a portion of Clydesdale ( Lanarkshire) and the Carse of Gowrie (Perthshire), in both of which the apple-orchards are of very considerable economical importance.

**ORCHARD-HOUSE**, a structure adapted to the cultivation of fruits, of finer kinds than can be produced in the open air, or in greater perfection, without the aid of artificial heat. It is the invention of Mr Rivers of London, and is a "glass-roofed shed," the front of which is lower than the back, so that the roof slopes towards the sun. The merit of the invention, however, consists not so much in the structure itself, or in the protecting of fruit-trees and admitting of the sun's rays by glass, as in the mode of their treatment, by which a limited space can be made to produce a prodigious quantity of fine fruit. The trees are planted in pots, are never allowed to attain a considerable size, and are so trained and pruned as to have the greatest possible amount of fruitful wood within the smallest possible compass. The pots have a large hole in the bottom, through which the roots may pass; and are placed upon a border carefully prepared for them, of loose and open materials, such as cinders, lime-rubbish, and broken bricks, enriched by manure. After the fruit is gathered, the roots are cut through at the bottom of the pot, and the trees are set aside to rest for the winter; and this treatment is repeated from year to year. The orchard-house is generally a very low structure, so that the foliage and fruit are very near the glass; its back being only 7 feet high, and its front only 2½ feet, for a width of 12 feet. A path is excavated as a trench of 2 feet deep, and 2½ feet wide, through the middle of it. For details as to glazing, ventilation, &c., we refer to Mr Rivers's pamphlet, "The Orchard-house," and to Chambers's "Information for the People,"

i. pp. 591-2 (new ed.). Plants for orchard-houses may now be purchased in nurseries. In the pamphlet of Mr Rivers, instructions will be found as to the training and treatment of different kinds of trees.

**ORCHESTRA** (Gr. *orchēstra*, from *orchesthai*, I dance), in the Greek theatres, the place allotted to the chorus of dancers; in modern theatres, the part of the building assigned to the instrumentalists; and in the modern concert-room, the place occupied by the instrumental and vocal performers. The word orchestra is also used to denote the musicians collectively.

A complete orchestra consists of stringed and wind instruments, and instruments of percussion. The employment of stringed and wind instruments together was long deemed a barbarism. Glück was among the first composers who shewed that they could be effectively combined, and his ideas were more fully developed by succeeding composers. The perfecting of the old instruments, and the introduction of new ones, formerly confined to military bands, have added immensely to the power and resources of the modern orchestra, whose capacities, however, have sometimes been misused.

The proper strength of an orchestra must depend on considerations connected with the locality. The stringed instruments should in all cases greatly outnumber the wind instruments; and those latter, the instruments of percussion. The stringed instruments as in general use are the violin, viola, violoncello, and double-bass, and their force often amounts to as many as fifty, while even in a large orchestra there are seldom more flutes, hautboys, or bassoons than two of each. The horn, trumpet, and ophicleide or serpent, the other wind instruments admitted into the orchestra, are used as sparingly; and of instruments of percussion, a pair of kettle-drums is often considered sufficient, though cymbals and triangles are occasionally added. In a small orchestra, trumpets, trombones, the serpent, and the kettle-drum should be avoided as being too noisy. By far the greatest part of the work falls to the share of the stringed instruments, the parts for which form a complete quartet for first violin, second violin, viola, and violoncello, which should be perfect within itself, independently of the parts for the wind instruments. The object of the double-bass is to enforce the violoncello part. This full quartet is occasionally interrupted by harmony in two or three parts, or passages in unisons or octaves. The success of the combination of wind and stringed instruments depends on the skill and judgment of the composer. The bassoon, horn, or flute may double any given part of the stringed instrument quartet, so as to produce an effect of reinforcement, or it may have its own distinctive melody. An occasional variety is produced by the entire sensation of stringed instruments for a short period, letting the wind instruments be heard alone.

The orchestra of a concert-room should be so arranged that the front is about five feet above the level of the floor, and it should rise gradually in steps towards the end wall, whose angles ought to be rounded off so as to enable the whole body of sound to be reflected. Reverberation is essential to the proper effect of music. From the exigencies of dramatic representation, a theatrical orchestra must necessarily be much inferior to a concert orchestra; the instrumentalists, brought together in the lowest part of a theatre on a horizontal plane between the spectators and the stage, are deprived of most of the advantages arising from a proper arrangement.

**ORCHIDÆÆ**, or Orchidaceæ, often popularly called Orchids, a natural order of endogenous plants, remarkable for the structure of their flowers, which are also of great beauty and exquisite fragrance. The perianth sometimes exhibits much variety of form, even in the same species; but is always irregular, its segments differing much from each other. There are usually six segments, arranged in two rows (*calyx* and *corolla*); although some of the most extraordinary forms of orchidaceous flowers are produced by the combination of certain segments into one piece. Spurs and other appendages of some of the segments are also common. The inner segments are often beautifully colored. The inferior segment of the corolla is called the lip (*labellum*), and is often lobed, spurred, or furnished with various appendages of different kinds. The stamens are united with the style into a single central column; the distinctive character of the Linnæan class *Gynandria*, of which the *O.* form the chief part. There is usually only one anther, with a tubercle on each side of it, the tubercles being abortive anthers; but sometimes the two lateral anthers are perfect, and the central one is abortive; and very rarely all the three anthers

are perfect. The anthers are usually two-celled; the grains of pollen cohering in two or more masses. The ovary is inferior, one-celled; the stigma usually a mere hollow in front of the column. The fruit is usually a capsule, opening with six valves, three of which have placentæ; the seeds numerous and very small. In a few cases, the fruit is fleshy. The *O.* are generally herbaceous perennials; but some of those found in warm climates are shrubs, and some of these, as *Vanilla*, are climbers. The root is usually composed of simple, cylindrical fibres, which are often accompanied with one or two fleshy tubercles, a tubercle dying and a new one being produced annually. The leaves are always simple, alternate, often sheathing at the base, often leathery, sometimes arising, in tropical species, not directly from the stem, but from fleshy bulb-like excrescences of it.—The species of *O.* are very numerous, about 3000 having been described. They are found in all parts of the world, except the coldest and the most arid regions; but are most numerous in the humid forests of the torrid zone, and particularly in America. Many of them are epiphytes, adorning the boughs of trees with splendid flowers. This is chiefly the case with tropical species, those of colder climates mostly growing on the ground. Only about thirty-eight species are reckoned in the British flora.—*SALIX* (q. v.), a delicate and nutritious article of food, is obtained from the root-tubercles of a number of species. The only other product of the order, which is of any commercial importance, is *Vanilla* (q. v.). The fragrant *Faan* (q. v.) leaves are the leaves of an orchid. Several species are known to possess tonic, stimulant, and antispasmodic properties, but none are of much importance in medicine.

Orchids have of late been much cultivated on account of their flowers, and many tropical species are amongst our most esteemed greenhouse plants; houses being sometimes specially devoted to them. Many of the epiphytal kinds may be planted in pots filled with loose fibrous peat, the roots of others are placed in baskets, or are fastened to blocks of wood, with a little moss or some such thing around them, to keep them from becoming too dry, and are thus placed on the shelves, or suspended from the roof of the house. Careful attention to temperature is necessary, and also to ventilation; and although much heat and moisture are requisite, the atmosphere must not be constantly very hot and humid, but seasons of rest must be given to the plants, which in their native climates have generally a wet and a dry season, the latter being to them in many respects what the winter is to plants of temperate regions.

Lindley has particularly signalled himself in the study of this interesting order of plants.

**O'RGHIL AND ORCHE'LLA WEED.** See **ARCHIL**.

**O'RGHIS** is a genus of *Orchideæ*, to which, as now restricted, eleven of the British species are referred. Some of them are among the most common of British *Orchideæ*, adorning meadows and pastures with their flowers in summer. The roots of some of the species yield salp. The lip of the flower in this genus has a spur. The flowers of the Early Purple *O.* (*O. mascula*), one of the most common species, are sometimes fragrant; but those of the Lizard *O.* (*O. hircina*), found in chalky districts in the south of England, are remarkable for their disagreeable goat-like or lizard-like smell.

**ORCHO'MENOS**, a famous and very ancient city of Bœotia, the capital of the once independent kingdom of the Minyæ, and hence called Minyæan *O.*, to distinguish it from another *O.* in Arcadia. It was situated northward from the Lake Copais, on the left bank of the Cephissus, and extended from the marshy edges of the lake up the face of a steep rocky hill, on which stood the Acropolis. In the earliest times, its dominions extended to the sea. Homer compares its treasures to those of Egyptian Thebes, and tells us that it sent 30 ships to the Trojan war. Some time after this event, it became a member of the Bœotian confederacy. During the Persian war, like the other towns of Bœotia, it abandoned the national cause. Its government was thoroughly aristocratic, and after the Peloponnesian war, when Thebes became a democracy, *O.* took part with Sparta, and shared in its first triumph over Thebes; but the victory of Epaminondas at Leuctra (371 B.C.) placed *O.* at the mercy of the Thebans, who soon after destroyed it by fire, and sold its inhabitants as slaves. It was again rebuilt during the Phocian war, but a second time destroyed in the reign of Philip of Macedon, who, however, once more rebuilt it; but it never again became prominent in history. *O.* was famous for its great musical festival in

Orcin  
Order

834

honor of the Graces, when poets and musicians assembled from all quarters to compete for prizes. The ruins of O. are still to be seen near the modern village of Skripá.—See K. O. Müller's "Orchomenos und die Mäuer," Leake's "Northern Greece," and Mure's "Tour in Greece."

ORCIN AND ORCEIN are coloring matters obtained from lichens. Orcin ( $C_{11}H_8O_4 + 2Aq$ ) may be obtained by boiling certain species of *Rocella* or *Lecanora* with lime for some hours, removing the lime, by a current of carbonic acid, evaporating and extracting with boiling alcohol, from which the orcin separates in red crystals. With chloride of lime, it gives a purple red color, which quickly changes to a deep yellow. Orcin is the true color-producing substance or chromogen of these lichens. In the presence of ammonia, it absorbs oxygen, and is converted into orcein ( $C_{11}H_7NO_4$ ), a nitrogenous compound of strong tinctorial power. When isolated, orcein forms a red flocculent powder, which is freely soluble in alcohol, forming a scarlet fluid. Potash and ammonia dissolve it readily, forming a splendid purple color, which is the basis of the ordinary archil of commerce. With metallic salts, its alkaline solutions yield beautiful purple lakes.

ORDEAL (Anglo-Saxon, *ordaal*; from *or*, primitive, and *daal*, judgment; Ger. *Urtheil*, judgment), a practice which has prevailed largely among various widely-separated nations, of referring disputed questions, particularly such as relate to the guilt or innocence of an individual, to the judgement of God, determined either by lot, or by the success of certain experiments. Of its existence among the ancient Jews, we have an instance in Numbers v., where a Hebrew woman, accused of adultery, is required to drink the waters of jealousy as a test of innocence; a similar ordeal for incontinence is in use among the natives of the Gold Coast of Africa. Compurgation of accused persons by fire, as existing among the Greeks, is referred to in Sophocles's "Antigone." Among the Hindus, the ordeal has been in use to be practised in nine different ways—by the *balance*, by *fire*, by *water*, by *poison*, by the *casha* or drinking water, in which images of the sun and other deities had been washed, by *chewing-rice*, by *hot oil*, by *red-hot iron*, and by drawing two images out of a jar into which they had been thrown. ("Asiatic Researches," vol. i. p. 389.)

The ordeal seems to be prevalent throughout Africa. "When a man," says Dr Livingstone, "suspects that any of his wives have bewitched him, he sends for the witch-doctor, and all the wives go forth into the field, and remain fasting till that person has made an infusion of the plant (called 'goho'). They all drink it, each one holding up her hand to heaven in attestation of her innocence. Those who vomit it are considered innocent, while those whom it purges are pronounced guilty, and put to death by burning. The innocent return to their homes, and slaughter a cock as a thank-offering to their guardian spirits. The practice of ordeal is common among all the negro nations north of the Zambesi." The women themselves eagerly desire the test on the slightest provocation; each is conscious of her own innocence, and has the fullest faith in the *muavi* (the ordeal) clearing all but the guilty. There are varieties of procedure among the different tribes. The Barotse pour the medicine down the throat of a cock or dog, and judge of the innocence or guilt of the person accused by the vomiting or purging of the animal.

Throughout Europe in the dark ages the ordeal existed under the sanction of law, and of the clergy. The most prevalent kinds of ordeal were those of *fire*, *water*, and the *wager of battle*. *Fire ordeal* was only allowed to persons of high rank. The accused had to carry a piece of red-hot iron for some distance in his hand, or to walk nine feet barefoot and blindfolded over red-hot ploughshares. The hand or foot was bound up and inspected three days afterwards; if the accused had escaped unhurt, he was pronounced innocent; if otherwise, guilty. Under such a judicial system, there were probably few acquittals; but it is believed that in the severer kinds of ordeal, precautions were sometimes taken by the clergy to protect those whom they wished to clear from suspicion. Queen Emma, mother of Edward the Confessor, when suspected of a criminal intrigue with Alwyn, Bishop of Winchester, is said to have triumphantly vindicated her character by walking unhurt over red-hot ploughshares. *Water ordeal* was the usual mode of trial allowed to bondsmen and rustics, and was of two kinds—the ordeal of *boiling water* and of *cold water*. The ordeal of *boiling water*, according to the laws of Athelstane, consisted in taking a stone out of boiling

water, where the hand had to be inserted as deep as the wrist; what was called the triple ordeal, deepened the water to the elbow. The person allowed the ordeal of *cold water* (the usual mode of trial for witchcraft), was flung into a river or pond; if he floated without any appearance of swimming, he was judged guilty—while if he sank, he was acquitted.

The *wager of battle* was a natural accompaniment of a state of society which allowed men to take the law into their own hands. The challenger faced the west, the challenged person the east; the defeated party, if he craved his life, was allowed to live as a "recreant;" that is, on retracting the perjury which he had sworn to. See **BATTEL, TRIAL BY.**

Other kinds of ordeal were practised in particular circumstances in different parts of Europe. In the ordeal of the *bier*, a supposed murderer was required to touch the body of the murdered person, and pronounced guilty if the blood flowed from his wounds. The ordeal of the *Eucharist* was in use among the clergy: the accused party took the sacrament in attestation of innocence, it being believed, that, if guilty, he would be immediately visited with divine punishment for the sacrilege. A somewhat similar ordeal was that of the *corsned*, or consecrated bread and cheese; if the accused swallowed it freely, he was pronounced innocent; if it stuck in his throat, he was presumed to be guilty. Godwin, Earl of Kent, in the reign of Edward the Confessor, when accused of the murder of the king's brother, is said to have appealed to the ordeal of the corsned, and been choked by it. An early form of ordeal, abolished by Louis le Debonnaire in 816, was that of the *cross*: the accuser and accused stood upright before a cross, and he who first fell, or shifted his position, was pronounced guilty. It was done away with, as being irreverent towards the mystery of the cross. Besides these, there was the ordeal by *lot*, dependent on the throw of a pair of dice, one marked with a cross, the other plain.

Trial by ordeal at first carried with it the sanction of the priests, as well as of the civil power, though the clergy in the course of time came to discountenance it. In England it seems to have been continued till the middle of the thirteenth century. On the continent it was, generally speaking, abolished rather earlier, although as late as 1498 we find the truth of Savonarola's doctrine put to the test, by a challenge between one of his disciples and a Franciscan friar, to walk through a burning pile. In Scotland, in 1180, we find David I. enacting, in one of the assemblies of the frank tenantry of the kingdom, which were the germ of parliaments, that no one was to hold an ordinary court of justice, or a court of ordeal, whether of battle, iron, or water, except in presence of the sheriff or one of his sergeants; though if that official failed to attend after being duly summoned, the court might be held in his absence. The first step towards the abolition of this form of trial in Saxon and Celtic countries, seems to have been the substitution of compurgation by witnesses for compurgation by ordeal. The near relatives of an accused party were expected to come forward to swear to his innocence. The number of compurgators varied, according to the importance of the case; and judgment went against the party whose kin refused to come forward, or who failed to obtain the necessary number of compurgators. To repel an accusation, it was often held necessary to have double the number of compurgators who supported it, till at length the most numerous body of compurgators carried the day.

**ORDER.** In Classic Architecture, the Order or ordonnance comprises the column with its base and capital and the entablature. There are five orders: (1) Tuscan, (2) Doric, (3) Ionic, (4) Corinthian, (5) Composite. The first and fifth are Roman orders, and are simply modifications of the others. The remaining three are the Greek orders. See **COLUMN, GREEK ARCHITECTURE, ROMAN ARCHITECTURE.**

**ORDER,** in Natural History, a group constituted for the purpose of classification, inferior to *class* and *sub-class*, but superior to *family*, *tribe*, *genus*, &c. The term **NATURAL ORDER** is used in botany to designate an order belonging to the natural system of classification, in contradistinction to one of an artificial system devised for mere convenience of the student, and signifies that the limits of the order agree with the truth of nature, and that it thus exhibits affinities really existing. In a branches of natural history, classification now proceeds on this principle.

**ORDER.** This word is applied to an aggregate of conventual communities comprehended under one rule, or to the societies, half military, half religious, out of

which the institution of knighthood sprang. Religious orders are generally classified as monastic, military, and mendicant.

The earliest comprehension of monastic societies under one rule was effected by St Basil, Archbishop of Cæsarea, who united the hermits and cœnobites in his diocese, and prescribed for them a uniform constitution, recommending at the same time a vow of celibacy. The Basilian rule subsists to the present day in the Eastern Church. Next in order of time was the Benedictine order, founded by St Benedict of Nursia, who considered a mild discipline preferable to excessive austerity. The offshoots from the Benedictine order include some of the most important orders in ecclesiastical history, among others the Carthusians, Cistercians, and Premonstrants. The order of Augustinians professed to draw their rule from the writings of St Augustine; they were the first order who were not entirely composed of laymen, but of ordained priests, or persons destined to the clerical profession.

The military orders, of which the members united the military with the religious profession, arose from the necessity under which the monks lay of defending the possessions which they had accumulated, and the supposed duty of recovering Palestine from the Saracens, and retaining possession of it. The most famous orders of this kind were the Hospitallers or Knights of St John of Jerusalem, the Knights Templars, and the Teutonic Order. Many other military orders existed, and not a few continue to exist, particularly in Spain and Portugal. The phraseology of the old military orders is preserved in the orders of knighthood of modern times, into which individuals are admitted in reward for merit of different kinds, military and civil.

The three mendicant orders of Franciscans, Dominicans, and Carmelites were instituted in the 13th century. Their principal purpose was to put down the opposition to the church, which had begun to shew itself, and also to reform the church by example and precept. At a later period the order of the Jesuits was founded, with the object of increasing the power of the church, and putting down heresy.—Notices of the more important orders, monastic, military, and mendicant, will be found under separate articles. See also **KNIGHTS** and **MONACHISM**.

**ORDE'RICUS**, Vitalis, a medieval historian, born at Atcham, near Shrewsbury, in 1075, was taken to France at the age of five, and educated for the monastic life in the abbey of Ouche, at Lisleux. He became a priest in 1107, and died, it is thought, about 1143. O. is the author of a so-called Church History ("Historie Ecclesiastice"), in 13 vols. It is a chronicle of events from the birth of Christ down to his own time. Books 3—6 give an account of the Norman wars in England, France, and Apulia down to the death of William the Conqueror. The last half of the book is the most valuable, being a record of the history of the author's own times. The first edition of the "Historie Ecclesiastice" was published by Duchesne, in his "Hist. Norm. Scrip." (1619). It has also been printed by the French Historical Society (3 vols. 1840), and was translated into French by Dubois (4 vols. 1825—1827).

**O'RDRLIES** are soldiers or sergeants appointed to wait upon generals and other commanding officers, to communicate their orders, and to carry messages. The *Orderly Officer*, or officer of the day, is the officer of a corps or regiment, whose turn it is to superintend its interior economy, as cleanliness, the goodness of the food, &c. *Orderly Non-commissioned Officers* are the sergeants in each company who are "orderly," or on duty for the week. On the drum beating for orders, they proceed to the Orderly Room, take down the general or regimental orders affecting their respective companies, shew them to the company officers, and warn the necessary men for any duties specified in those orders. An *Orderly Book* is provided by the captain of each troop or company in a regiment for the insertion of general or regimental orders from time to time issued.

**ORDERS**, Army, are general, divisional, brigade, or regimental. General orders are issued by the commander-in-chief of an army, and affect the whole of his force. The others emanate from generals of division or brigade, or from officers commanding regiments, and severally affect their respective commands.

**ORDERS IN COUNCIL**, orders by the sovereign with the advice of the privy council. The privy council of Great Britain has no power to legislate, except so far as authorised to do so by parliament; but in periods of emergency, it has neverthe-

less occasionally issued and enforced orders of a legislative kind; those who were concerned in passing, promulgating, or enforcing the orders, trusting to parliamentary protection, and taking on themselves the personal responsibility of the proceeding. In such cases, an act of indemnity afterwards passed has relieved from liability those who advised the order or acted under it, and given compensation to all who suffered by its enforcement. This course was adopted in 1766 with regard to an embargo on the exportation of corn, issued in consequence of a deficient harvest and prospect of famine. An important constitutional question was raised by the famous Orders in Council issued by Great Britain in 1807 and 1809, in reprisal for Napoleon's Berlin and Milan decrees. The Berlin decree, issued on the 21st of November 1806, declared the whole of the British islands to be in a state of blockade, and all vessels trading to them to be liable to capture by French ships. It also shut out all British vessels and produce both from France and from all the other countries which gave obedience to the French. A subsequent decree, issued soon afterwards, obliged all neutral vessels to carry letters or certificates of origin—that is, attestations by the French consuls of the ports from which they had sailed, that no part of the cargo was British. In retaliation for the Berlin decree, the British government issued, on the 7th January 1807, an Order in Council, subjecting to seizure all neutral vessels trading from one hostile port in Europe to another with property belonging to an enemy. This order was at first extensively evaded, while the French made vigorous efforts to enforce the Berlin decree; the result was, that new Orders were issued by the British government on the 11th and 21st of November 1807, declaring France and all states subject to the French to be in a state of blockade, and all vessels liable to seizure which were found to have certificates of origin on board, or which should attempt to trade with any of the ports of the world thus blockaded. Neutral vessels intended for France, or any other hostile country, were ordered, in all cases, to touch first at some British port, and to pay custom-house dues there, after which they were in certain cases to be allowed to depart for their destination; and vessels clearing from a hostile country were similarly to touch at a British port before proceeding on their voyage. On the 27th of December 1807, Napoleon's Milan decree was issued, which declared the whole British dominions to be in a state of blockade, and all countries were prohibited from trading with each other in any articles of British produce or manufacture. The Americans, and those of the public of Great Britain who were interested in the export trade, exclaimed loudly against the edicts of both powers, and the legality as well as the expediency of the Orders in Council were called in question in parliament. The result was, that an inquiry was instituted into the effect of the orders, from which no direct result followed. But, in the meantime, on the 26th April 1808, a new Order in Council was issued, limiting the blockade to France, Holland, a part of Germany, and the north of Italy, and the order which condemned vessels which had certificates of origin on board was rescinded. Subsequent orders introduced a system of furnishing licences to vessels to proceed to hostile ports after having first touched and paid custom-house dues at a British port; no fewer than 16,000 of these licences are said to have been granted. The legality of these Orders has been called in question, on the ground that they were more of a legislative than an executive character, in so far as a fictitious blockade, where there is no blockading force present, is contrary to the law of nations; it has been defended on the ground that they were issued in execution of the royal prerogative of declaring and conducting war. They are generally believed to have added to the general distress, and the check on the progress of manufactures produced by Napoleon's decrees; but, on the other hand, it has been maintained that they were essential to the effective prosecution of the war.

There are various matters connected with trade and the revenue as to which Orders in Council have been authorised by statute; parliament, in fact, delegating its legislative authority to the Queen in Council. For example, the International Copyright Act, 7 and 8 Vict. c. 12, contains a provision for empowering the crown, by Order in Council, to extend the privileges of British copyright to works first published in any state which gives a like privilege to the productions of this country.

**ORDERS**, Holy, an institution regarded in the Greek and Roman churches as a sacrament, by which ministers are specially set apart for the service of religion,



and are regarded as receiving a certain religious consecration, or, at least, designation for their office. While some of the reformed churches altogether deny the distinction of ranks in the ministry, none of them admits more than three ranks, of bishop, priest, and deacon. But in the Roman and Greek churches, a further classification exists. In the Roman Church, a distinction is made between the major (or holy) orders and the minor orders. Of the major orders, three have been described in general terms, under the head **HIERARCHY** (q. v.), viz., the classes of bishops, priests, and deacons. A fourth rank of sub-deacons is generally regarded as one of the major orders, but its functions closely resemble in their nature and their degree those of the deacon. The minor orders in the Roman Church are four in number—those of door-keeper, reader, exorcist, and acolyte. To none of these orders is any vow of celibacy annexed. Some of their functions had their origin in the peculiar religious condition of the early church. The duties of door-keeper arose chiefly out of the discipline in regard to the penitents and catechumens; but although these functions find no room in the modern discipline of the Roman Church, the door-keeper of the modern church is held to succeed to other functions of his ancient prototype in relation to the catechetical instruction of children and of the poor and ignorant. Preparatory to the receiving of these orders, candidates are initiated in what is called the *Tonsure*, which consists in the cutting off of the hair, as a symbol of separation from the world and its vanities—a rite which appears also as one of the ceremonies of the religious profession. Tonsure, however, is not reckoned as an order; it is but a distinguishing characteristic of a class. In the Roman Church, the sacrament of orders is held to produce an indelible character, and therefore to be incapable of being forfeited and of being validly repeated. This, however, applies only to the holy orders. The Greek Church has the distinction of major and minor orders, in common with the Roman. But the Greeks commonly exclude sub-deaconship from the major orders, and all the functions of the four minor orders of the Roman Church are united by the Greeks in one single order, that of reader (*anagnostes*).

In the Anglican and other Reformed Episcopal Churches, the three higher orders of bishop, priest, and deacon are alone retained. An Anglican clergyman may be deprived of his benefice, or suspended by his bishop for various ecclesiastical offences; and the right of the Court of Arches to pronounce sentence of deprivation has also been recognised. But in the usual case of deprivation, the clergyman does not forfeit his status of priest or deacon, which can only be lost by deposition or degradation. Statute 22, Hen. VIII., c. 1, s. 6, reserves to the ordinary the power of degrading clerks convicted of treason, petit treason, murder, and certain other felonies before judgment. A bishop may be deprived of his see by his metropolitan, with or without the co-operation of a synod of the bishops of the province, but it has been questioned whether he can be lawfully deprived of his orders as bishop. A clergyman of the Church of England and Ireland cannot become a member of the House of Commons. In the Presbyterian and other non-Episcopal churches, the ceremony of ordination is not held to impart any indelible character. A minister found guilty of heresy or immorality, is deprived of his office by *deposition*, by which his clerical status is forfeited. His removal from his charge, however, in any other way, does not affect his office as a minister; and a minister removed from one charge to another, or, after a time, inducted into a new charge, is not re-ordained. A minister having no charge or flock, may yet dispense the sacraments, if duly called upon. A minister deposed ceases altogether to be a minister, and is no more capable of any of the functions of the office, than if he had never been ordained.

The ceremony of *imposition of hands* is used in almost all Protestant churches in the ordination of ministers, the ordaining bishop or presbyters placing the right hand on the head of the person ordained; and is always accompanied with prayer. It is deemed a proper and Scriptural form (1 Tim. iv. 14), but not essential.

In the Church of Scotland and other Presbyterian churches, when an already ordained minister is inducted into a new charge, no imposition of hands takes place. In the Scottish and American Presbyterian churches, candidates for the ministry are *licensed to preach the gospel* before being called to any particular charge, and are then styled *licentiates* or *probationers*. They are licensed according to an old phrase, "for trial of their gifts," but are not entitled to dispense the sacraments.

There is nothing to prevent a minister of the Church of Scotland, or any Pres-

byterian or Independent church, from being a member of the British House of Commons.

**O'RDINAL**, the service used in Episcopal churches for the ordination of ministers. The English ordinal was drawn up by a commission appointed in the third year of Edward VI. (1550), and added to the "Book of Common Prayer." It was slightly modified in the reign of Elizabeth, and was again revised by the Convocation of 1661. The English ordinal, in its general structure, resembles the ancient services used for that purpose, but possesses much greater simplicity, and has some features—e. g., the numerous questions addressed to the candidates—peculiar to itself. There are separate services for the "making of deacons" and the "ordering of priests," but these are practically joined in one, and used on the same day. The service for the consecration of bishops is altogether distinct.

The ordination takes place at one of the Ember seasons, and during the public service, after morning prayer and a sermon on the subject, and begins with the presentation of the candidates by the archdeacon. The bishop inquires as to their fitness, and commends them to the prayers of the congregation. The litany is then said with special petitions for the candidates for each order, and the communion service commences with a special collect, epistle, and gospel. Between the epistle and gospel, the oath of supremacy is administered, and the candidates for deacons' orders are questioned by the bishop and ordained. The gospel is read by one of the newly-ordained deacons. The candidates for priests' orders are then solemnly exhorted and interrogated, and the prayers of all present are asked for the divine blessing upon them. For this purpose a pause is made in the service for silent prayer. After this the hymn, *Veni Creator Spiritus* (Come, Holy Ghost, our Souls Inspire)—a composition of great antiquity, supposed to be as old as the 4th c.—is sung, and the candidates kneeling before the bishop, he and the assistant presbyters lay their hands upon the head of each, with the words, "Receive the Holy Ghost for the office and work of a priest in the Church of God," &c.

The only other ceremony is the presentation of each candidate with the Bible in token of authority to preach; as the deacons had been before presented with the New Testament with authority to read the gospel. The service concludes with the administration of the sacrament of the Lord's Supper.

The consecration of bishops is performed by an archbishop, or some bishop appointed in his place, and two or more of his suffragans, and may take place on any Sunday or holy day. The service is very similar to that for the ordination of priests.

**O'RDINARIES**, or Honorable Ordinaries, in Heraldry, certain charges composed of straight lines, and in very common use, to which writers on heraldry had assigned abstruse symbolical meanings, but whose real chief peculiarity seems to be that they originally represented the wooden or metal fastenings of the shields in use in actual warfare. The ordinaries are usually accounted nine—the Chief, Pale, Fess, Bar, Bend, Bend Sinister, Chevron, Saltire, and Cross. Heraldry vary a little in their enumeration, some taking in the Pile in place of the Bar. Each is noticed under a separate article.

**ORDINARY**, a term used in the British navy in two senses. First, as regards ships, vessels in ordinary are those out of actual use, commonly dismantled, and occasionally roofed over, to protect them from the weather. They are congregated near the several dock-yards, where their masts and gear lie ready for their immediate fitting for sea when required. A few men have charge of each vessel; a certain number of vessels constitute a division, with a lieutenant in command; and a line-of-battle-ship, called a "guard-ship of ordinary," is responsible for the different divisions at each port. The ships are moored in safe places, as up the Medway, in the recesses of Portsmouth and Plymouth harbors, &c.

As regards men, an *ordinary seaman* is one capable of the commoner duties, but who has not served long enough at sea to be rated as an Able Seaman (q. v.). His pay is 11d. a day on entering, and 13d. a day on promotion to the first class, or 1s. and 1s. 8d. if engaged for continuous service.

**ORDINARY** (Lat. *ordinarius*) is the name commonly given to a person, who, in virtue of his office, and in his own consequent right, is competent to do certain acts or to decide certain causes. In this sense, there are many functionaries who may be

called by the name ordinary. But the word in canon law, when used without other additions, is understood to mean the bishop, who is the ordinary of his own diocese, and is competent of himself to do every act necessary for its government, and for the ordering of the spiritual concerns of his flock. The jurisdiction of the ordinary is called by that name, in contradistinction to "extra-ordinary jurisdiction," which arises from some abnormal circumstances, and from "delegated" jurisdiction, which is imparted by the ordinary to another person to be exercised vicariously.

In English Law, the ecclesiastical jurisdiction which was formerly vested in bishops and their officers relating to wills and marriages, was recently abolished, and transferred to a new judge, called the Judge Ordinary, who is entirely disconnected with the church. The bishops still retain their jurisdiction in matters of discipline as regards the clergy.—In Scotland, the Judge Ordinary generally means the sheriff deputy or substitute, who has ordinary jurisdiction in the county. Lord Ordinary is the name given to certain judges of the Outer House in the Court of Session.

**ORDINARY OF ARMS**, in Heraldry, an index or dictionary of armorial coats, arranged, not according to names, like an armory, but according to the leading charges in the respective shields, so as to enable any one conversant with heraldic language, on seeing a shield of arms, to tell to whom it belonged. A very imperfect ordinary for England is appended to Edmonson's "Heraldry": a far more complete and elaborate work of the same kind, Papworth's "Ordinary of British Armorial," partly edited by Alfred Morant, was published in 1874.

**ORDINATION**, the rite or ceremony by which ministers of the Christian Church are dedicated to their sacred office. The use of a ceremonial for such purposes is traceable among the Jews (Exod. xxix. 24, Levit. xxi. 10, Num. iii. 3); and the New Testament contains frequent reference to the specific ceremonial of "imposition of hands" (Acts vi. 1-7, xlii. 1-4, xiv. 23; 1 Tim. iv. 14. v. 22; 2 Tim. i. 6). In the Roman, the Greek, and the other Eastern Churches, this rite of ordination is held to be sacramental, and it is reserved, at least as regards the major orders (see **ORDERS HOLY**), exclusively to bishops. In extraordinary cases it was permitted to cardinals and to certain abbots to confer the minor orders. Considerable controversy exists among Catholic writers as to what are the essential portions (*Materia Sacramenti*) of the rite of ordination. Some place it in the "imposition of hands," some in the "presentation of the instruments" symbolical of each order. The controversy derives some importance from the diversity which exists between the Greek and Roman ceremonial; but on this head Roman Catholics maintain that the essential rites are contained alike in both ceremonials. As regards the *validity* of the rite of ordination, the mere fact of its being conferred by a bishop suffices; but there is not any part of the Roman discipline which is more jealously guarded by laws than the administration of orders. The candidate can only be *lawfully* ordained by "his own bishop" (*proprius episcopus*), or with the authority of his own bishop, which must be communicated to the ordaining bishop by what are called disjunctory letters. The candidate may be claimed by a bishop as by "his own bishop" under any of four titles—of birth, of domicile, of benefice, or of connection by personal service; and if an ordination be attempted without some one of these titles, heavy ecclesiastical penalties are incurred as well by the ordainer as by the ordained. On the part of the candidate himself, certain qualifications are required; and certain disqualifications created or propounded by the canon law, called *irregularities*, are held to render an ordination in some cases invalid, and in all unlawful.

In the Church of England and other Reformed Episcopal churches, the rules of the ancient canon-law are retained, by which no one could be ordained without previous examination of his fitness, or who was disqualified by bodily infirmity, illegitimacy, immorality, or simony, or who was unprovided with a title (i.e., an appointment to serve in some church) which should provide him with a maintenance; or who, being a candidate for deacon's orders, was under 20, and for priest's, under 24 years of age; but the age for admission to deacon's orders is changed to 23. A college Fellowship is admitted as a title. (For the ceremony of Ordination see **ORDINAL**.) A person can only be ordained by the bishop in whose diocese he is to serve, except on *letters dismissory* from that bishop to another.

In other Reformed churches ordination is performed by the presbytery, or by

one or more ordinary ministers. Some small Protestant denominations have no ceremony of ordination whatever.

**ORDNANCE** (*ordnance*, primarily, any disposition, arrangement, or equipment; and then applied incidentally to a particular part of the equipment or apparatus of war), a name applied to the guns and munitions of an army generally, and in particular to the great guns. Descriptions of the various sorts of ordnance will be found under **CANNON, FIREARMS, GUN, HOWITZER, MORTAR, RIFLED ORDNANCE**.

**ORDNANCE DEPARTMENT**, one of the oldest departments under the crown, was abolished by an Order in Council of the 25th May 1855, after an existence of at least 400 years. Its constitution, its important functions, and the causes which led to its dissolution will be found under **BOARD OF ORDNANCE**. The early history of the department is lost in the middle ages; but it appears to have risen gradually under the Lancastrian kings. A master of the Ordnance is mentioned in the time of Richard III.; but we read of John Louth being Clerk of the Ordnance as early as 1418. Henry VIII. constituted the Board, adding a Lieutenant, a Surveyor, and a Storekeeper, to whom a Clerk of the Cheque was subsequently joined. With the exception of the last, whose office was abolished in the beginning of the present century, this organisation was maintained until the abolition of the whole. In 1604, James I. dignified the Master and Lieutenant with the respective title of Master-general and Lieutenant-general. The history of the Ordnance Office is of importance in British history, as in all wars it has been responsible not only for the management of the *matériel* of the armies, but also for the direction of the *personnel* of the artillery and engineers. By an Order in Council of June 23, 1870, the Department of Ordnance in a very modified form was revived under the Surveyor-general of the Ordnance, as a section of the War Office, responsible for all supplies and matériel of war.

**ORDNANCE SELECT COMMITTEE** was, until 1870, a committee composed of scientific officers, to advise the Secretary of State for War on all inventions in war matériel. It had its offices at Woolwich, in the midst of the manufactories of the Royal Arsenal, and near the headquarters of the royal artillery, by whom most of the designs had to be practically tested. The president of the committee was usually a general officer of artillery; and a captain in the royal navy served as vice-president. Since 1870, these functions have been fulfilled by officers of the Department of the Director of Artillery and Stores, who has his headquarters at the War Office.

**ORDNANCE SURVEY**. By this term is understood the various operations undertaken by the Ordnance department of the British government for preparing maps and plans of the whole kingdom and its parts. The idea of a general map of the country to be executed by the government was first proposed after the rebellion in 1745, when the want of any reliable map of the northern parts of Scotland was much felt by the officers in command of the royal troops. Its execution was intrusted to Lieutenant-general Watson, the deputy quarter-master of North Britain; but it was mostly carried out by Major-general Roy, an officer of engineers. The drawing, on a scale of one inch and three-fourths to the mile, was completed in 1755; but in consequence of the war which broke out in that year, was never published. In 1763 it was proposed to extend the survey to the whole kingdom; but the first steps to effect this were taken only in 1784, when Major-general Roy commenced measuring a base-line on Hounslow Heath, near London. This principal triangulation was designed partly for astronomical purposes, and partly as a basis for a map on a small scale. The base-line was remeasured with great care in 1791; and detail plans were commenced by officers of the Royal Engineers, partly for practising them in military drawing, and partly for the purpose of forming plans of some portions of Kent for the use of the Ordnance. The principal object was, however, the instruction of a corps of military surveyors and draughtsmen, the plans themselves being regarded as of secondary importance. In 1794, the survey for the one-inch map was begun, and some sheets were published in 1796. As the series of principal triangles were extended westwards towards the Land's End, it was thought right to measure another base, for verification, on Salisbury Plain in 1794; and two other base-lines were subsequently measured—one in 1801 at Misterton Carr, and the other in 1806 on Ruddian Marsh. Though first intended chiefly as a military map, the publication of the survey

soon created a desire on the part of the public for better maps, and surveyors were then hired to hasten its progress. This, however, was very slow, the map being at one time entirely suspended during the war in the beginning of this century, and even the parts which were executed, having been done by contract, were found very inaccurate. In this condition the survey of England continued during the first quarter of the present century, sometimes delayed by the government from motives of economy, at other times urged on by the county gentlemen, who wished the map either as a hunting-map or for local improvements.

In Scotland, the principal triangulation was begun in 1809, but was discontinued in the following year, to enable the persons who had been employed there to carry forward the subordinate triangulation required for constructing the detail maps in England. In 1813 it was resumed, and continued steadily up to 1819: a new base-line having been measured on Belhelvie Links, near Aberdeen, in 1817, and the great sector used at various stations, both on the mainland and in the islands. In 1820 it was again suspended, was resumed in 1821 and 1822, and anew broken off in 1823, the large theodolite being wanted in order to proceed with the principal triangulation in South Britain. In 1824 the survey of Ireland was begun, and nothing more was done in Scotland till 1833, except that some detail surveying for a one-inch map was continued for a few years in the southern counties. The chief strength of the surveying corps was now transferred to Ireland. A map of that country was required for the purpose of making a valuation which should form the basis of certain fiscal arrangements and other improvements which the social evils and anomalies of Ireland urgently demanded. For this map a scale of six inches to the mile was adopted, as best suited for the purposes in view. On this scale the whole map was completed, and published in 1845, though the first portions were in an imperfect form, and needing revision, which was proceeded with in 1873.

In 1833 the triangulation of Scotland was resumed; and the survey of Ireland having been finished in 1840, surveys for a six-inch map were begun for the northern portions of England which had not been mapped on the one-inch scale. In connection with this map, the base-line on Salisbury Plain was remeasured with great accuracy in 1849, and its length found 36577·8581 feet. In 1841, some secondary operations for a map of Scotland, also on a six-inch scale, were begun; but proceeded so slowly, that in 1850 only the map of Wigtownshire and some parts of Lewis were completed. Much dissatisfaction having been expressed in Scotland by the press and public bodies, as to the slow progress of the map and the six-inch scale on which only it was published, a committee of the House of Commons (Lord Elcho's) recommended the six-inch maps to be stopped, and the one-inch map completed as speedily as possible. This change produced much discussion as to the relative value of the one-inch and six-inch scales then in use, and the expediency of adopting a still larger scale as more valuable to the public. Circulars were issued, asking the opinion of various public bodies, and of scientific and practical men, as to the proper scale for a great national survey. The great preponderance of opinion was in favor of a scale of 1-2500 of nature, or nearly one inch to the acre. This scale was therefore ordered by a treasury minute of 13th May 1855 (Lord Palmerston's), and though subsequently stopped, in consequence of a motion by Sir Denham Norreys in the House of Commons in June 1857, was again recommended by a royal commission (December 1857), and ordered to be resumed by another treasury minute (11th September 1858). In 1861 a select committee was again appointed, and reported that it is desirable that the cadastral survey on the scales directed by the treasury minute of the 18th May 1855 be extended to those portions of the United Kingdom that have been surveyed on the scale of one-inch to the mile only. This recommendation has now been adopted by the government, and the survey is at present proceeding on the following scales: Towns having 4000 or more inhabitants are surveyed on a scale of 1-500 of the linear measurement, which is equivalent to 126·72 inches to a mile, or 41½ feet to an inch; Parishes (in cultivated districts) 1-2500 of the linear measurement, equal to 25·344 inches to a mile, or one square inch to an acre; Counties on a scale of six inches to a mile; Kingdom, a general map one inch to a mile.

The sheets of the one-inch map join together, so as to form a complete map of the whole kingdom. This is true also of the sheets of each county on the six-inch scale, and of each parish on the 1-2500 scale, but the sheets of different counties and parishes are not connected. The 1-2500 scale also applies only to cultivated, popu-

lous and mineral districts; the Highlands of Scotland, and other extensive moorland and uncultivated tracts, being only surveyed on the six-inch scale, and published on the one-inch scale.

In the report on the progress of the Ordnance Survey, it is stated that in England, up to the end of 1875, an area of 27,491 square miles (the area of England being 58,000 sq. m.) had been surveyed, of which 1186 sq. m. were surveyed in 1875. Since 1854, when the survey on the scale of 1-2500th began, the English counties that had been surveyed were Durham, Westmoreland, Northumberland, Cumberland, Middlesex, Kent, Essex, Surrey, Hampshire, and Sussex, also (it having been decided that the mineral districts should take precedence of the rest of the kingdom) Cheshire, Flintshire, and Denbighshire, with portions of several other counties.

In Scotland, up to the end of 1875, 29,297 square miles (out of a total area of 36,000 sq. m.) had been surveyed, of which 1186 sq. m. were done in 1875. After 1876 the Shetlands alone remained to be done. At the end of 1875, maps on the 1-2500 scale had been published for an area of 11,107 sq. miles. On the six-inch scale, an area of 21,332 sq. miles had been published. 15,960 sq. m. of the one-inch map have been completed and published with hills.—In Ireland, as stated, the six-inch maps have been long published, and are now in process of revision. A one-inch map of the whole in outline has been published, and is being completed by the addition of hills. The engraving of hills in the remainder is also being proceeded with. In all the three kingdoms, plans of many of the towns on the 10 and 6 feet scale are also published.

The sketch now given of the history of this great national undertaking will shew that it has been conducted at different times on different scales and plans, and that the system now pursued was only adopted after much discussion both in parliament and out of doors. The map was originally begun as a military map, and the scale of one inch to the mile chosen, without considering whether some other scale would not offer greater advantages. Many now think that a scale a little larger, and an aliquot part of nature, such as 1-50,000, or about  $1\frac{1}{2}$  inch to the mile, would have been preferable for the small map; in which case a scale of 1-10,000 of nature, or about  $6\frac{1}{2}$  inches, might have been chosen for the intermediate, instead of the six-inch scale selected at first for mere local purposes in Ireland. Be this as it may, the arguments in favor of the one-inch map are, that it is the most convenient both as a general and travelling map. For general views of the structure of a country, the distribution and relations of its mountains, plains, valleys, and rivers, the one-inch is admitted to be superior to the six-inch, and thus better adapted in the first instance for laying out roads, railways, or other extensive public works, or for the publication of a general geological survey. Such a map, on the other hand, is on too small a scale to admit of correct measurements of small distances; it is in some respects a generalised picture, and not a correct plan. The six-inch maps were at first selected in Ireland as the smallest size on which correct measurements of distances and areas could be made. On them every house and field, and almost every tree or bush, might be laid down. Hence they are superior for working out details, as in minute surveys of railways or roads, or the complex geological structure of rich mineral districts. On such sheets, too, a proprietor or farmer may find every field laid down, and the relative heights indicated by contour lines, and may therefore use them for drainage and other improvements. It has also been proposed to use these six-inch maps as a record of sales or encumbrances of land, thus lessening the cost and simplifying the transfer of property. On the other hand, their size unfits them for most of the purposes for which the one-inch map is useful, and the contour lines give a far less vivid and correct impression of the physical features of a country than the hill sketching of the one-inch map. Most of the purposes of the six-inch plans are attained in a still more perfect manner from the 25-inch plans or cadastral survey. This last name is taken from the French *cadastre* (a register of lands), and is defined (in the *Recueil des Lois, &c.*) as a plan from which the area of land may be computed, and from which its revenue may be valued. The purposes to which these large plans may be applied are, as estate plans, for managing, draining, and otherwise improving land, for facilitating its transfer by registering sales or encumbrances; and as public maps, according to which local or general taxes may be raised, and roads, railways, canals, and other public works, laid out and executed.

Nearly all the states of Europe have produced trigonometrical surveys, many of

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them of great excellence as scientific works. All of these have been published, or are in course of publication, on convenient scales; generally smaller than one inch to a statute mile. The most important of these are:

Austria and Northern Italy, scale 1-80,000 or 4-5ths of an inch to a mile.

Bavaria, Baden, Wurtemberg, and the Hessian territories 1-80,000 or 4-5ths of an inch to a mile.

Belgium, 1-80,000 or 4-5ths of an inch to a mile.

Denmark, survey map in preparation.

—, Iceland, surveyed and published on different scales.

France, 1-80,000 or 4-5ths of an inch to a mile; and a reduction to 1-320,000 or 5 miles to an inch.

Great Britain, 1 inch, 6 inches, and, in the lowland districts, 25 inches to a mile; and the coast survey, general charts,  $2\frac{1}{2}$  miles to an inch; harbors and bays, from 2 inches to 12 inches to a mile.

Hanover and East Prussia, 1-100,000 or 7-11ths of an inch to a mile.

Italy (see Sardinia, Tuscany, &c.), survey maps of Naples, Rome, &c., in progress.

Greece (French survey), 1-288,000 or 4 6-11 miles to an inch.

Netherlands, 1-50,000 or 1 8-11 inches to a mile.

Prussia, 1-100,000 or 7-11ths of an inch to a mile, and many smaller.

Russia, survey map in progress.

Sardinia, 1-250,000 or  $\frac{1}{4}$ th of an inch to a mile.

Saxony, 1-67,000 or 1-9 inches to a mile.

Switzerland, 1-100,000 or 7-11ths of an inch to a mile.

Spain and Portugal, surveys commenced.

Sweden and Norway, surveys in progress.

Tuscany, 1-200,000 or about 3 miles to an inch.

The greatest extra European work of the kind is the "Trigonometrical Survey of India," which was begun 70 years ago, and has been conducted with great ability. The work is drawing to a close, but will still occupy several years. The maps are published on a scale of 1-250,000 or  $\frac{1}{4}$ th of an inch to a mile. In America, the coast Survey of the United States, a map of great accuracy and minute detail, has been going on for many years. The general charts are published on a scale of 1-80,000 or 4-5ths of an inch to a mile; the harbors and ports, 1-20,000 or 3 1-5th of an inch to a mile. No systematic survey has yet been undertaken for the interior of the country.

No portion of South America has been trigonometrically surveyed, except the republics of Peru and Chili, which are in progress.

The Geological Survey, though under a different department of government (Science and Art), may be shortly noticed here. The English survey was begun in June, 1835, and has now been completed, with the exception of Cumberland, Yorkshire, Norfolk and Cambridge. The Irish survey was begun in 1840, but was subsequently suspended till 1845. It is now completed in the counties of Dublin, Meath, Westmeath, Longford, Kildare, Queen's County, King's county, Carlow, Wicklow, Wexford, Kilkenny, Waterford, Cork, Tipperary, Kerry, Limerick, and Clare. In 1834, the survey was extended to Scotland, and now extends over the counties of Edinburgh, Huddington, Fife, Kinross, Linlithgow, Peebles, Lanark, Ayr, Renfrew, Dumbarton, Stirling, Perth, Wigton, Kirkcudbright, Dumfries, Selkirk, Berwick and Roxburgh. The surveys are made on the six-inch maps in the parts of the country where these exist, but the results are published on the one-inch scale only, except some of the coal-fields, which are issued also on the six-inch scale. Besides the maps, sheets of sections, horizontal and vertical, with valuable memoirs, are also published.

O'REGON, one of the United States of America, in lat.  $42^{\circ}$ — $46^{\circ}$  n., long.  $116^{\circ}$   $40'$ — $124^{\circ}$   $25'$  w., bounded n. and e. by Washington, from which it is chiefly separated by Columbia River; e. by Idaho, the Lewis or Snake River intervening; s. by Nevada and California; and w. by the Pacific Ocean; being 340 miles from east to west, by 275 from north to south, with an area of 93,274 sq. m. The principal rivers are the Columbia, and its branches—the Willamette, Fall River, Snake River, and the Owyhee. The Columbia is a large river, navigable 96 miles to the Cascade Mountains, through which it passes, but the entrance is difficult. The Willamette drains a large and fertile valley between the mountains and the ocean. The Cascade Mountains,

which have extinct volcanic peaks of 4,000 to 10,000 feet high, run north and south, dividing the state into two unequal regions. The western third of the state, bordering the Pacific, has a mild, equable, and moist climate, with valleys of great fertility, where pines grow from 250 to 900 feet high, and firs from 4 to 10 feet in diameter. The rainfall at Astoria, mouth of the Columbia River, is 86 inches. East of the mountains, the climate is dry and variable, and the soil less fertile. Gold and silver are found in the Cascade Mountains, with copper, platinum, iridium, and osmium. Coal has been discovered on Coosue Bay. The chief agricultural productions are wheat, oats, potatoes, and apples. The great forests abound with the grisly and black bear, panther, wild-cat, elk, deer, antelope; among the birds are the California vulture, golden eagle, American swan, Canadian goose, &c.; while the rivers swarm with salmon. There were, in 1876, 23 organised counties. Most of the settlements are on the Columbia River and in the Willamette Valley. The chief towns are—Salem, the capital, on the Willamette River, pop. 4,000; Portland, 10,000; and Oregon City, about 2,000. Within the state are about 10,000 Indians and 2,000 Chinese. Four colleges have been founded, 1 medical school, numerous academies, common schools, daily and weekly papers, and churches of several denominations. O. was the name formerly given to the whole territory west of the Rocky Mountains, claimed by the United States, as far north as lat. 54° 40' n. This claim was resisted by the British government, which asserted a right to the entire territory, and in 1818 a treaty was made, and renewed in 1827, giving joint occupation, which was terminated in 1846 by notice from the United States government, and the question seemed likely to involve the two countries in war, when a compromise was offered by Lord Aberdeen, on the part of the British government, and accepted by that of the United States, by which the boundary was settled on the 49th parallel. The northern portion is now Washington, and the eastern Idaho Territory. The coast was discovered, and Columbia River entered, in 1792 by Captain Gray of Boston. It was explored in 1804 and 1806 by Captains Lewis and Clarke, U. S. army. In 1811, John Jacob Astor founded Astoria as a trading dépot of the American Fur Company, but sold out afterwards to the North-west Fur Company. In 1845, the gift of 320 acres of land to each married couple of settlers caused a large emigration. The territorial government was organised in 1848, and in 1859 it was admitted as a state. Pop. in 1860, 52,464; in 1870, 90,776; in 1880, 174,768.

**OREIDE**, a new alloy lately introduced by the French as a substitute for ormolu, which it excels in its gold-like character. There are two formulas for composing it. In the first the ingredients are: copper, 100.0; tin, 17.0; magnesia, 6.0; sal ammoniac, 3.6; quicklime, 1.30; argols, or unrefined tartar, 9.0. In the second, zinc is substituted for the tin. The latter does not possess the same brilliancy as the former. The metals are first melted, and the other ingredients, after being thoroughly incorporated together by powdering and mixing, are slowly added, and the whole is kept in a state of fusion for about an hour, and the scum removed from time to time.

**OREL**, a government in the south-west of Central Russia, bounded on the w. by Little Russia and the government of Smolensk. Area, 17,951 square miles; pop. (1870) 1,596,881. The surface is flat, with rising grounds in the vicinity of the towns of Kromy and Malo-Archangelsk, from which the Oka and Sosna respectively take their rise. The government is drained by the Desna on the west, an affluent of the Dnieper; the Oka on the north, an affluent of the Volga; and the Sosna on the east, an affluent of the Don. The soil is fertile, and the climate mild. The western part of the government abounds in woods. In the district of Briansk, in the north-west, there are a number of iron mines. Agriculture and the cultivation and preparation of hemp are the chief employments of the people. Corn is very extensively grown, and great quantities are sent to St Petersburg, Riga, and the Black Sea, ports for export. The principal article of export is wheat, in grain and in flour. Sailcloth, rope and hemp-yarn manufactures are carried on; glass and iron works are numerous. The hemp of O. is reckoned the best in Russia; and the oil obtained from hemp-seed, and used in Russia as an article of food, is extracted at 2,000 mills. The rearing of cattle and horses is much attended to; almost all the considerable landowners keep studs.

**ORE'L**, a thriving town of Great Russia, capital of the government of the same name, stands on the Oka, at its confluence with the Orlik, 226 miles south-south-



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west of Moscow, and 678 miles south-south-east of St Petersburg. It was founded in 1566, as a stronghold in defence of what was then the Russian frontier, against the incursions of the Tartar tribes of the Crimea. Its importance as a fortress ceased after the annexation of Little Russia, and it then became a commercial town. The town owes much to its advantageous position on a navigable river in the midst of the most fertile provinces of Russia. The railway from Moscow to Odessa, on the Black Sea, passes through O., and the Vitebsk line affords it direct railway communication with the port of Riga, and thus its export trade has been greatly promoted. It is the seat of a bishop, and contains numerous churches; its houses are for the most part constructed of wood. There is an important ferry here over the Oka. The chief manufacturing establishments in the town are yarn and rope factories. The principal articles of export are cereals and hemp. On the 7th June 1848, O. suffered severely from a great fire, which destroyed 1237 houses, four bridges, and a number of granaries. Pop. (1867) 43,575.

ORELII, Johann Kaspar, an eminent philologist and critic, was born at Zürich, 13th February 1787. His father was long the *Landvogt* of Wädenswil. He studied in the *Carolinum* at Zürich, and betook himself enthusiastically to the study of the ancient and of modern languages and literature. In 1806, he was ordained as a clergyman. He spent some years as a tutor at Bergamo; and while there, published, in 1810, two parts of a work, entitled "*Beiträge zur Geschichte der Ital. Poesie*." In 1813, he became a teacher in the cantonal school at Chur; in 1819, Professor of Eloquence and Hermeneutics in Zürich; and after the foundation of the Zürich High School, in which he took an active part, he was one of its chief ornaments. There never was a man more zealous in the cause of education. It was during this latter and most distinguished period of his career that he produced most of his learned works, and trained to a correct knowledge of antiquity a numerous band of scholars. His political sympathies and opinions were not, however, confined to the ancient world; he took the liveliest interest in the struggles of Greece for freedom, and in the political reformation of his native country. He died 6th January 1849. O. edited many classical authors with great learning, taste, and acute discrimination; in particular, his editions of Horace (2 vols. Zür. 1837—1838), Tacitus (2 vols. Zür. 1846—1847) and Cicero (4 vols. Zür. 1856—1881) deserve mention; also an "*Onomasticon Tullianum*" (3 vols. Zür. 1836—1839), executed in association with Balzer, and an "*Inscriptionum Latinarum Selectarum Collectio*" (2 vols. Zür. 1836).

O'RENBURG, a Russian government in the Ural region, lies partly in Europe and partly in Asia, and extends between the governments of Tobolsk on the n. e. and Samara on the s. w. Area of the government, 73,600 square miles; pop. (1879) 900,547. The government is divided into four districts—Orenburg, Verkhue, Uralsk, Ovesk, and Troitsk and Tchelabinsk. Capital, Orenburg (q. v.). Till 1883, O. comprised within its area the whole of what is now the distinct government of Ufa (q. v.); but in that year the part of O. lying to the north-west of the Ural mountain range was organised into the new government. The population, the surface, soils, flora, and fauna of this extensive country are of the most various kinds. The government is one of the most elevated in the empire; but it also contains extensive low-lying tracts and steppes. It is traversed by numerous navigable rivers, by means of which and by canals it is in communication with the Caspian and Baltic Seas, and with the Arctic Ocean. The main streams are the Bielata (running into the Kama, a tributary of the Volga), the Tobol and the Ural. As many as 3200 larger and smaller lakes lie within the frontiers. Of the whole area, about three-tenths are forest, a half is waste land, and only about a twentieth part is cultivated. The hill country has much pleasant scenery, but great tracts of the steppe regions are utterly barren and desolate. The inhabitants are made up of Russians, Bashkir, Tartar, and Kirghis tribes, Kalmycks and certain Finnish peoples, with a few Germans. The trade is chiefly with Bokhara, Khlva, Tashkend, and the Kirghis; the exports are gold, silver, and other metals, corn, skins, and manufactured goods; the imports, cattle, cotton—the demand for and supply of which have greatly increased since the commencement of the American war—and the other articles of Asiatic trade. The imports are either disposed of to Russian merchants in the custom-house on the frontier, or are carried by Asiatic traders into Russia, and sold at the great national market of Nijni-Nov-

gorou. There are in the province numerous iron and copper works, as well as valuable gold diggings, both belonging to the crown and to private individuals. The salt mines are valuable. There is a small-arms factory on a large scale, and a few other factories. Cattle-breeding is very extensively carried on. The number of horses in O. is larger than in any other Russian government. The southern frontiers are defended, at intervals of 12 or 15 miles, by fortified settlements, inhabited by Cossacks; those on a larger scale being surrounded by a bulwark and a moat. This line of forts extends over a frontier of 2000 miles eastward to the boundaries of China; the series from the mouth of the Ural to the Tobol, occupied by upwards of 242,000 Ural and Orenburg Cossacks, being known as the Orenburg line. The region of which O. forms part was originally called Bashkir-land, and became subject to the Czar of Moscow in 1556. Besides the towns giving name to the governmental districts, the only other place of consequence is Mijask.

ORENBURG, a town on the eastern frontier of European Russia, in the government of the same name, on the river Ural, 1393 miles south-east of St Petersburg, lat.  $51^{\circ} 45'$  n., long.  $88^{\circ} 6'$  e. The foundation of the fortress and town were laid here in 1742. Pop. (1867) 83,481. It is the centre of the governor-generalship of the government of the same name, has an excellent custom-house, and carries on an extensive trade with Kbirghiz and other Asiatic tribes. It imports cotton, silk-stuffs, and shawls from Bokhara, Khiva, and Tashkent; tea (brought mostly on camels) from China; and sheep and cattle from the Kossacks and Kbirghiz. The sheep are killed in autumn for the fat and skins, which are purchased by Russian merchants. Corn, skins, and metals are the principal exports. In the neighborhood is the very rich rock-salt mine of Iletsk. At O. the Ural is frozen from October till March.

ORENSE (anc. *Aquæ calidæ Cilitorum*, or *Aquæ Originis*), a city of Spain, the capital of the province of Orense, in Galicia, near the frontier of Portugal, on the left bank of the Minho. O. contains a number of interesting ecclesiastical edifices. It is highly reputed for its hot sulphurous springs, called *Las Burgos*, which issue—three in number—almost boiling from a granite rock in the western part of the town. The baths of O. were known to the Romans, and were in much repute among the Goths. O. carries on manufactures of linen, leather, and chocolate. It has a large trade in hams, which are in great repute throughout Spain. Pop. 10,775.

OREODA'PHNE, a genus of trees of the natural order *Lauraceæ*, sometimes called MOUNTAIN LAUREL. The fruit is succulent, partly immersed in a deep thick cup formed of the tube of the calyx. *O. opifera* is a native of the countries on the lower part of the Amazou. A volatile oil obtained from the bark is used as a liniment, and when kept for a short time deposits a great quantity of camphor.—*O. cupularis* is a very large tree with strong-scented wood, the bark of which yields the cinnamon of Mauritius. It grows also in Bourbon and Madagascar.—*O. fastens*, a native of the Canaries, has wood (*Tyl-wood*) of a most disagreeable odor. *O. bullata*, found at the Cape of Good Hope, is also remarkable for the disagreeable odor of its wood, the *Stink-wood* of the colonists; but it is hard, durable, beautiful, takes an excellent polish, and is used in ship-building.

ORES. Any mineral or combination of minerals containing as much metal as to be profitably extracted, is reckoned by miners an ore. The proportion necessary for this purpose is, of course, very various, according to the value of the particular metal and the facility or difficulty of *reducing* the ore. A rock containing only 1 per cent. of iron is never called an ore; one containing the same proportion of gold is a very rich ore. Metals rarely exist in ores in a pure or native state; they are almost always chemically combined with oxygen, sulphur, or other elements.

Ores present themselves in a multiplicity of forms and positions in the solid crust of the earth. Sometimes they are sprinkled through the whole mass of the rocks in which they occur, as is often the case with gold, tin ore, and magnetic iron ore. Sometimes they are deposited in regular parallel beds between the strata of other rocks, as in the case of many iron-stones and of cupreous schist. At other times, they occur in irregular lumps or concretions; or they fill up the fissures of other rocks, forming veins, particularly silver, copper, and lead ores; or lastly, they are found in detritus, gravel, sand, and other alluvial deposits. This last form is evidently the result of disturbance and transport from some of the other positions above specified. And as the metallic parts of the mineral masses or rocks so disturbed and

transported are the heaviest, and are insoluble in water, they are more concentrated in these deposits than in their original position, and can therefore be extracted with greater advantage. Such deposits are called *washings*, from the metal being separated from the other débris by the process of washing. Gold and platinum are mostly got in this way in the Ural and Altai Mountains, and gold in Guiana, California, and Australia. Tin ore is also found in alluvial deposits in Cornwall and India. The reduction of ores is treated of under **METALLURGY** and the names of the several metals.

**ORFILA**, Mateo José Bonaventura, a celebrated physician and chemist, and the recognised founder of the science of toxicology, was born at Mahon in Minorca, 24th April 1781. His father, who was a merchant, intended that his son should follow the same pursuit; but young O. shewed so strong a predilection for the study of medicine, that all thoughts of a mercantile career for him were dismissed, and he was sent to the medical schools of Valencia and Barcelona. In the latter of these seminaries, he so distinguished himself, that the junta of the province resolved to defray the expense of his further education in Paris, on condition of his returning to Barcelona to fill one of the chairs in their medical school; and accordingly O. departed for Paris in 1807. The junta were prevented from fulfilling the agreement by the outbreak of war with France; but O., who had now made many friends in Paris, was unable to continue his studies. In October 1811, he received the degree of Doctor of Medicine, and immediately commenced a private course of lectures on chemistry, botany, and anatomy, which was largely attended, and, along with his successful practice, soon rendered him famous. In 1813 appeared the first edition of his celebrated work on poisons, entitled "*Traité des Poisons tirés des Règnes Minéral Végétal, et Animal, or Toxicologie Générale*" (Paris). The work was commended by the Institute, and rapidly passed through a number of editions. In 1816, on the occasion of a short visit to Minorca, he met with an enthusiastic reception; and on his return to Paris, became court physician. In 1819, he was created a citizen of France, and became professor of jurisprudence; and in 1823, was transferred to the chair of chemistry, to which, in 1831, was added the deanship of the faculty. His prosperity was now at the full; his lectures were more popular than ever; his works were reckoned as master-pieces; and he himself, by the gentility of his disposition and his many accomplishments, was a universal favorite in society. In all cases of suspected poisoning, he was a most important witness. From 1834, he was a member of the council of public instruction, and procured the passing of many useful measures, such as the creation of secondary medical schools, and the multiplication of means of instruction and observation. He also organised the clinical hospital, founded a new botanic garden, and a museum of comparative anatomy, which is now known by his name. On the outbreak of the revolution of 1848, he was deprived of his place in the medical faculty on account of his conservative opinions, but retained his professorship. He died at Paris, March 12, 1853. His great work on toxicology has gained for him undying fame; it is a vast mine of information, the result of the author's solitary indefatigable researches; and includes symptoms of poisoning of all kinds, the appearances in the body to which poisons give rise, their action, and the means for their detection. It is well written, and exhibits the accuracy of language equally with the sound judgment of its author. His other works are not nearly so famous, partaking more of the character of compilations; the chief of them are—"Éléments de Chimie appliqués à la Médecine" (Paris, 1817; 8th edition, 1851); "Traité de Médecine Légale" (1823—1825: 4th edition, 1847); "Mémoires sur Plusieurs Questions Médico-légales" (Paris, 1839); and "Recherches sur l'empoisonnement par l'Acide Arsenique," &c. (Paris, 1841). He also contributed largely to various journals, dictionaries, encyclopædias, and other periodicals. He has left a number of Memoirs, which have not yet been published.

**OROSZHÁZA** (pronounced *Oroszháza*), a thriving town of Hungary, in the county of Békés Csanád, 31 miles northeast from Szegedin. Pop. (1869) 14,554.

**ORGAN** (Gr. *organon*, a contrivance requiring skill on the part of the user of it, a musical instrument played by finger-keys, and in general partly also by foot-keys, and consisting of a large number of pipes of metal and wood made to sound by a magazine of wind accumulated by bellows, and admitted at will by the player. The following description is necessarily restricted to the most fundamental arrangements

of this very complicated instrument. As met with in cathedrals and large churches, the organ comprises four departments, each in most respects a separate instrument with its own mechanism, called respectively the *great-organ*, the *choir-organ*, the *swell organ*, and the *pedal-organ*. Each has its own clavier or key-board, but the different claviers are brought into juxtaposition, so as to be under the control of one performer. Claviers played by the hands are called *manuals*; by the feet, *pedals*. Three manuals, belonging to the choir, great, and swell organs respectively, rise above each other like steps, in front of where the performer sits; while the pedal-board by which the pedal-organ is played is placed on a level with his feet. The condensed air supplied by the *bellowes* is conveyed through wooden tubes or trunks to boxes, called *wind-chests*, one of which belongs to each department of the organ. Attached to the upper part of each wind-chest is a *sound-board*, an ingenious contrivance for conveying the wind at pleasure to any individual pipe, or pipes, exclusively of the rest. It consists of two parts, an *upper board* and an *undr board*. On the upper board rest the *pipes*, of which a number of different quality, ranged behind each other, belong to each note. In the under board is a row of parallel *grooves*, running horizontally backwards, corresponding each to one of the keys of the clavier. On any of the keys being pressed down, a valve is opened which supplies wind to the groove belonging to it. The various pipes of each key stand in a line directly above its groove, and the upper surface of the groove is perforated with holes bored upwards to them. Were this the whole mechanism of the sound-board, the wind, on entering any groove, would permeate all the pipes of that groove; there is, however, in the upper board, another series of horizontal grooves at right angles to those of the lower board, supplied with *sliders*, which can, to a small extent, be drawn out or pushed in at pleasure by a mechanism worked by the *draw-stops* placed within the player's reach. Each slider is perforated with holes, which, when it is drawn out, complete the communication between the wind-chest and the pipes: the communication with the pipes immediately above any slider being, on the other hand, closed up when the slider is pushed in. The pipes above each slider form a continuous set of one particular quality, and each set of pipes is called a *stop*. Each department of the organ is supplied with a number of stops, producing sounds of different quality. The *great-organ*, some of whose pipes appear as *show-pipes* in front of the instrument, contains the main body and force of the organ. Behind it stands the *choir-organ*, whose tones are less powerful, and more fitted to accompany the voice. Above the choir-organ is the *swell-organ*, whose pipes are enclosed in a wooden box with a front of *louvre-boards* like Venetian blinds, which may be made to open and shut by a pedal, with a view of producing *crecendo* and *diminuendo* effects. The *pedal-organ* is sometimes placed in an entire state behind the choir-organ, and sometimes divided, and a part arranged on each side. The most usual compass of the manuals is from C on the second line below the bass staff, to D on the third space above the treble staff; and the compass of the pedals is from the same C to the D between the bass and treble staves. The real compass of notes is, as will be seen, much greater.

*Organ-pipes* vary much in form and material, but belong to two great classes, known as *mouth-pipes* (or *flute-pipes*) and *reed-pipes*. The essential parts of the mouth-pipe are the *foot*, the *body*, and a flat plate, called the *language*, extending nearly across the pipe at the point of junction of foot and body. There is an opening in the pipe, at the spot where the language is discontinuous. The wind admitted into the foot rushes through the narrow slit, and, in impinging, imparts a vibratory motion to the column of air in the pipe, the result of which is a musical note dependent for its pitch on the length of that column of air, and consequently on the length of the body of the pipe: by doubling the length of the pipe, we obtain a note of half the pitch, or lower by an octave. Such is the general principle of all mouth-pipes, whether of wood or of metal, subject to considerable diversities of detail. Metal pipes have generally a cylindrical section; wooden pipes, a square or oblong section. A mouth-pipe may be stopped at the upper end by a plug called a *toppion*, the effect of which is to lower the pitch an octave, the vibrating column of air being doubled in length, as it has to traverse the pipe twice before making its exit. Pipes are sometimes half-stopped, having a kind of chimney at the top. The *reed-pipe* consists of a reed placed inside a metallic, or occasionally a wooden pipe. This *reed* is a tube of metal, with the front part cut

Organ  
Organic

850

away, and a tongue or spring put in its place. The lower end of the spring is free, the upper end attached to the top of the reed; by the admission of air into the pipe, the spring is made to vibrate, and in striking either the edge of the reed or the air, produces a musical note, dependent for its pitch on the length of the spring, its quality being determined to a great extent by the length and form of the pipe or bell within which the reed is placed. When the vibrating spring does not strike the edge of the reed, but the air, we have what is called the *free reed*, similar to what is in use in the Harmonium (q. v.). To describe the pitch of an organ-pipe, terms are used derived from the standard length of an open mouth-pipe of that pitch. The largest pipe in use is the 32-foot C, which is an octave below the lowest C of the modern pianoforte, or two octaves below the lowest C on the manuals and pedal of the organ: any pipe producing this note is called a 32-foot C pipe, whatever its actual length may be. By a 32-foot or 16-foot stop, we mean that the pipe which speaks on the lowest C on which that stop appears, has a 32-foot or a 16-foot tone.

The stops of an organ do not always produce the note properly belonging to the key struck; sometimes they give a note an octave, or, in the pedal-organ, even two octaves lower, and sometimes one of the harmonics higher in pitch. *Compound* or *mixture stops*, have several pipes to each key, corresponding to the different harmonics of the ground-tone. There is an endless variety in the number and kinds of stops in different organs; some are, and some are not continued through the whole range of manual or pedal. Some of the more important stops get the name of *open* or *stopped diapason* (a term which implies that they extend throughout the whole compass of the clavier); they are for the most part 16-feet, sometimes 32-feet stops; the *open diapason* chiefly of metal, the *close* chiefly of wood. The *dulciana* is an 8-foot manual stop, of small diameter, so called from the sweetness of its tone. Among the reed-stops are the *claron*, *oboe*, *bassoon*, and *vox humana*, deriving their names from real or fancied resemblances to these instruments and to the human voice. Of the compound-stops, the most prevalent in Britain is the *sequialtera*, consisting of four or five ranks of open metal pipes, often a 17th, 19th, 22d, 26th, and 29th from the ground-tone. The resources of the organ are further increased by appliances called *couplers*, by which a second clavier and its stops can be brought into play, or the same clavier can be united to itself in the octave below or above.

Organs are now generally tuned on the equal temperament. See TEMPERAMENT. The notation for the organ is the same as for the pianoforte, in two staves in the treble and bass clefs; but in old compositions, the soprano, tenor, and alto clefs are used.

Instruments of a rude description, comprising more or less of the principle of the organ, seem to have existed early. Vitruvius makes mention of a hydraulic organ, but his description is not very intelligible. The organ is said to have been first introduced into church music by Pope Vitalian I. in 666. In 757, a great organ was sent as a present to Pepin by the Byzantine emperor, Constantine Copronymus, and placed in the church of St Corneille at Compiègne. Soon after Charlemagne's time, organs became common. In the 11th c., a monk named Theophilus wrote a curious treatise on organ-building. But it was not till the 15th c. that the organ began to be anything like the noble instrument which it now is. The family of the Autignati, in Brescia, had a great name as organ-builders in the 15th and 16th centuries. The organs of England were also in high repute, but the puritanism of the civil war doomed most of them to destruction; and when they had to be replaced after the Restoration, it was found that there was no longer a sufficiency of builders in the country. Foreign organ-builders were therefore invited to settle in England, the most remarkable of whom were Bernhard Schmidt (generally called Father Smith) and his nephews, and Renatus Harris. Christopher Schreider, Snetzler, and Byfield succeeded them; and at a later period, Green and Avery, some of whose organs have never been surpassed in tone. The largest English organs are those of York Cathedral, Birmingham Town Hall, Christ Church, London; and a gigantic and exceedingly perfect instrument, completed in 1876 for the Hall, Primrose Hill, London. The latter surpasses in size the famous Haarlem organ, long reckoned the largest in the world, which is 103 feet high and 50 broad. The German organs are remarkable for preserving the balance of power well among the various masses, but in mechanical contrivances they are surpassed by those of England.

For a full account of the structure of the organ, see Hopkins and Rimbaud,

"The Organ, its History and Construction" (Lond. 1855). Rink's "Praktische Orgelschule," Leipzig, v. y., is the best work on organ playing.

**ORGAN, Orga'nic, O'rganism.** The word *organ* is derived from the Greek *organon*, an instrument, and is sometimes employed almost in its original sense. But it has received a signification more peculiarly its own, and with which alone the word *organism* is connected, as the designation of any of the parts or members of a living body, the *organism* being the living whole, animal or vegetable, which these organs compose. The idea of an organism or of organisation is almost as much involved in obscurity and difficulty as that of *life*, with which it is so closely connected. But it is observable that a living body is entirely composed of organs, and these themselves of other organs, until we come to elementary cells; and also, that all the parts are mutually dependent on each other; and therefore an organism has been defined as a natural whole, in which all the parts are mutually to each other means and end. The juice which nourishes a plant is elaborated by the plant itself, although the supplies are drawn from without. The leaves of a plant are produced by the stem, but re-act upon the stem in promoting its growth. This mutual dependence of parts strongly distinguishes an organism from a *machine*, in which the parts concur for a common end, to which each contributes in its own way, but in which each does not contribute to the support of all or any of the rest. In organisms, moreover, besides this support and maintenance of the different parts or organs, there is a provision for the production of new organisms of the same kind, the reproduction or propagation of the species, to which there is nothing analogous beyond the sphere of organic life. Amongst organic beings, as we ascend in the scale from the lowest kinds of plants and animals to the highest, we observe an increasing number of organs and of functions of organs. In the animal kingdom, organic life appears as possessed of sensation and spontaneous motion; whilst plants are limited to growth, assimilation, and propagation. The question as to the nature of organic processes connects itself with a most difficult question as to the relation of chemical processes with psychical functions, chemical processes being certainly carried on, but singularly modified or directed by the living powers of the organic being.—The term *organic* is frequently applied to those things in which an analogy is traced to living creatures, in the mutual dependence of parts. Such an analogy may be traced in social life and in political life; and the more perfectly this relation of mutual dependence or mutual usefulness is established, the better is the state of things, social or political. It is also the highest praise of a work of art, that it suggests this idea of an organic relation of its parts to each other, and to the whole.—*Organic Laws* are those which are fundamental or most essential to the system to which they belong.

**ORGANIC ANALYSIS.** When a complex organic substance is submitted to chemical examination, the first point is to determine its *proximate* constituents, or, in other words, the several definite compounds of which it is made up. Opium, for example, is thus found to have as its proximate constituents meconic acid, morphia, codeia, and some ten or twelve other substances. The modes by which these proximate constituents are separated are various; the chief being the action of certain solvents, such as ether, alcohol, and water, which extract some of the materials and leave others undissolved. Thus ether is the special solvent of fatty and waxy matters, resins, and camphors; alcohol dissolves the same substances with less facility, but on the other hand takes up many substances which are insoluble in ether; while water, which scarcely acts upon the above-named matters, dissolves saccharine, gummy, and starchy matters, and salts of organic acids. The proximate constituents being thus determined, the next point is to determine their qualitative and quantitative (or ultimate) composition; and it is to these processes—especially the last—that the term *organic analysis* is for the most part restricted.

**Qualitative Analysis.**—It is shewn in the article **ORGANIC COMPOUNDS**, that the ordinary ingredients for which we must seek are carbon, hydrogen, oxygen, nitrogen, and sulphur. Carbon and hydrogen may be simultaneously detected by burning the compound (which must be previously well dried) in a glass-tube in contact with oxide of copper, which readily yields up its oxygen. The carbon is thus converted into carbonic acid, which if passed into baryta water forms a white precipitate of carbonate of baryta, and the hydrogen into water, which collects in drops in a small

cooled receiver attached to the tube. Carbon may also be usually recognised by the black residue which almost always remains on burning an organic matter, especially in a narrow test-tube in which there is little air. The presence of *nitrogen* may in most cases be readily ascertained by heating a portion of the substance in a test-tube with an excess of hydrate of potash, when a distinct odor of ammonia is perceived. *Sulphur* is detected by igniting the compound with hydrate of potash and oil, whereby sulphuric acid is formed; and phosphorus and arsenic may be detected by the same means. The presence of *oxygen* cannot, as a general rule, be directly determined.

*Quantitative Analysis.*—The first attempts to determine the quantitative composition of organic bodies were made, more than half a century ago, by Gay Lussac and Thenard. The process originally proposed by them has been modified and improved by various chemists, especially by Berzelius, Prout, and Liebig, and it is mainly owing to the great simplifications introduced by the last-named chemist, and to the consequently increased facility of conducting an ultimate analysis, that our knowledge of the composition of organic bodies has so vastly enlarged during the last twenty years.

The operation is always effected by causing complete combustion of a known weight of the body to be analysed, in such a manner that the carbonic acid and water which are formed in the process shall be collected, and their quantities determined, from which, of course, the carbon and hydrogen they respectively contain may be readily calculated. The apparatus required for the analysis of a compound containing carbon, hydrogen, and oxygen only, consists of (1) a *combustion tube*, composed of hard white Bohemian glass, having a diameter of half an inch or less, and a length of from 14 to 18 inches. One end is drawn out in a point and closed, while the edges of the other (or open) end are made smooth by fusion in the blow-pipe flame. (2) A thin sheet-iron furnace, in which the tube is placed and supported during combustion. (3) A small light tube (which may be either a bulb-tube, or a U-tube), which is filled with fragments of spongy chloride of calcium to absorb the watery vapor that is driven through it; and (4) Liebig's bulb-apparatus, containing a solution of potash of specific gravity 1.27, for the purpose of absorbing the carbonic acid. The chloride-of-calcium tube is connected by a well-dried perforated cork to the open extremity of the combustion tube, and by a little tube of flexible caoutchouc, secured by silk cord to the potash apparatus.

In performing an analysis a little freshly prepared oxide of copper is first introduced into the combustion tube, then a mixture of about 5 grains of the substance to be analysed, with an excess of the oxide, while the tube is lastly filled to within an inch of its open mouth with the oxide alone. The tube is then placed in the furnace, which may be heated with charcoal or gas. (Hofmann's gas furnace, in which is a peculiar form of burner called the *atmopyre*, is the best. It is described in vol. xi. of "The Journal of the Chemical Society.") Red-hot charcoal is now placed round the anterior part of the tube, containing the pure oxide of copper; and when this is red-hot, the fire is slowly extended towards the further extremity by shifting a movable screen. When the tube has been completely heated from end to end, and no more gas is disengaged, the charcoal is gradually removed from the further extremity of the tube, and the point of the latter broken off; after which a little air is drawn through the whole apparatus, so as to secure any remaining carbonic acid and watery vapor. The parts are then detached, and the increase of weight of the chloride-of-calcium tube and potash apparatus is determined by an accurate balance. The following account of an actual analysis of crystallised cane-sugar (borrowed from Fownes's "Chemistry") will serve to illustrate the preceding remarks:

	Grains.
Quantity of sugar employed.....	4.750
Potash apparatus, after experiment.....	781.18
“ “ , before experiment.....	773.63
Carbonic acid.....	7.31
Chloride-of-calcium tube, after experiment.....	226.05
“ “ “ , before experiment.....	223.30
Water.....	9.75

7.31 grains carbonic acid = 1.994 grains carbon; and 2.75 grains water = 0.8056 grains hydrogen: or in 100 parts of sugar, carbon, 41.98; hydrogen, 6.43; oxygen by difference, 51.59.

For the methods of determining other elements quantitatively, such as nitrogen, chlorine, sulphur, phosphorus, &c., we must refer to the various works that have been published on organic analysis, amongst which those of Liebig, Fresenius, and R6se deserve special mention.

**ORGANIC BASES.** The present remarks must be regarded as supplementary to the article **ALKALOIDS**. They refer (1) to the classification of organic bases and (2) to their formation.

(1) From the fact that nearly all artificial organic bases are (as will be afterwards shown) actually constructed from ammonia, and that, whether artificially or naturally formed, they exhibit the property of basicity, which is the leading characteristic of ammonia, chemists have been led to refer organic bases generally to the typical body ammonia, and have succeeded in demonstrating that they are constructed upon or derived from the simple type  $\text{NH}_3$ . Berzelius believed that all the alkaloids actually contained ammonia as an ingredient of their composition, a view which is now untenable; and it is to Liebig that we are indebted for the idea that they are derivatives of ammonia, or, in other words, amidogen bases or ammonia in which an equivalent of hydrogen is replaced by an organic radical. The subject has been thoroughly worked out by Dr Hofmann, who originally proposed to classify these bodies under the heads of *amidogen*, *imidogen*, *nitrile*, and *ammonium* bases; but afterwards adopted the terms *primary amines*, *secondary amines*, and *tertiary amines*, in preference to *amidogen*, *imidogen*, and *nitrile* bases—the word *amines* being applied to all organic bases that are derived from ammonia ( $\text{NH}_3$ ). The amines may be (1) *monamines*, (2) *diamines*, (3) *triamines*, (4) *tetramines*, or (5) *pentamines*, according as they be constructed upon a single, double, treble, quadruple, or quintuple atom of  $\text{NH}_3$ . We shall confine our illustrations of the meaning of these terms to the monamines, both because they form the most important group and because they are much more readily elucidated than the other groups, which are extremely complicated in their composition. *Monamines* are constructed upon the single atom of ammonia,  $\text{H}_3\text{N}$ . In *primary monamines* one of the atoms of hydrogen is replaced by an organic radical, R; and hence their general formula is  $\text{RH}_2\text{N}$ . Ethyl-amine or ethyla ( $\text{C}_2\text{H}_5$ ) $\text{H}_2\text{N}$ , or  $\text{C}_2\text{H}_7\text{N}$ , is an example. In *secondary monamines* two of the atoms of hydrogen are replaced by two atoms of either the same or of different radicals. Hence their general formula is  $\text{RR}'\text{HN}$ , where R and R' may be the same or different radicals. Diethyla ( $\text{C}_2\text{H}_5$ ) $_2\text{HN}$ , or  $\text{C}_4\text{H}_{11}\text{N}$ , and methyl-ethyl-amine, or methyl-ethyla ( $\text{C}_2\text{H}_5$ )( $\text{CH}_3$ ) $\text{HN}$ , or  $\text{C}_3\text{H}_9\text{N}$ , are examples. In *tertiary monamines* the three atoms of hydrogen are replaced by three atoms of the same or different radicals; their formula therefore is  $\text{RR}'\text{R}''\text{N}$ , when R, R', R'' may or may not differ from one another. Trimethyl-amine or trimethyla ( $\text{C}_2\text{H}_5$ ) $_3\text{N}$ , or  $\text{C}_6\text{H}_{15}\text{N}$ , and methyl-ethyl-phenyl-amine or methyl-ethyl-phenyla ( $\text{C}_2\text{H}_5$ )( $\text{C}_6\text{H}_5$ )( $\text{C}_6\text{H}_5$ ) $\text{N}$ , or  $\text{C}_9\text{H}_{13}\text{N}$ , afford examples of the radicals being all the same and of their being all different. This last example affords a good illustration of the fact, that although the modern nomenclature of organic chemistry includes long and apparently complex words, these words to a great degree represent the composition of the substance they are used to indicate; methyl ( $\text{C}_2\text{H}_5$ ), ethyl ( $\text{C}_2\text{H}_5$ ), and phenyl ( $\text{C}_6\text{H}_5$ ), mainly contributing to form methyl-ethyl-phenyla.

(2.) Although all attempts at forming in the laboratory those alkaloids that naturally exist in plants, such as morphia, quinia, and strychnia, have hitherto failed, a large number of organic bases have been prepared by artificial means, such as: a. By the destructive distillation of organic bodies containing nitrogen. Thus, in the preparation of coal-gas, four at least of these compounds are obtained—viz., aniline, picoline, lenkol (or quinoline), and pyridine. b. By the distillation of certain nitrogenous compounds with caustic potash. In this way aniline is obtained from indigo. c. By the combination of ammonia with the aldehyds and with certain volatile oils which possess the properties of aldehyds. Thus acetic aldehyd yields dimethyla, and oil of mustard yields thioaniline. d. By the substitution (by the action of strong nitric acid) of one atom of nitrous acid ( $\text{NO}_2$ ) for one atom of hydrogen in certain hydrocarbons. e. By the processes of fermentation and



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putrefaction. Thus wheaten flour yields by putrefaction trimethylia, ethylia, and amylia.

**ORGANIC COMPOUNDS.** It was formerly believed that the compounds to which the term *organic* is applied could only be produced by a vital force acting in a more or less complex animal or vegetable organism. It is, however, now known that this view is altogether untenable, and that many substances which are products of animal or vegetable organisms may also be formed artificially in the laboratory. Thus urea, the chief and most characteristic organic constituent of urine, may be formed by the direct union of chlorine and carbonic acid (which form *phosgene gas*) with ammonia; and glycose or grape-sugar may be artificially produced from starch, woody fibre, paper, linen, &c. Although such cases as that of urea, in which a complex organic product ( $C_2H_4O_2N_2$ ) is produced by the direct union of three inorganic substances (and many other cases of the same nature might be adduced), shew that there is no definite line of demarcation between organic and inorganic products, it is useful, as a matter of convenience, to classify chemical compounds, according to their natural origin.

The following are the leading characteristics of organic compounds: Those which occur naturally rarely consist of more than four elements—viz., carbon, hydrogen, nitrogen, and oxygen—although a few contain sulphur, and possibly (but this is doubtful) phosphorus. By artificial means, however, organic compounds can be formed containing chlorine, bromine, iodine, selenium, tellurium, and many of the metals. Carbon is universally present both in natural and artificial organic compounds. The number of equivalents entering into the composition of organic compounds is usually higher than in the case of inorganic compounds. There is no organic compound into which less than two equivalents of carbon enter, and, according to some chemists, both oxygen and sulphur only enter these compounds in double equivalents. Melissic acid, for example (one of the constituents of wax), is represented by  $C_{60}H_{100}O_4$ ; that is to say, each equivalent of the acid is composed of 124 equivalents of the elements entering into its composition; and each equivalent of the solid fat, commonly known as stearine, contains 114 equivalents of carbon, 110 of hydrogen, and 12 of oxygen. No instance is known in which an organic compound has been formed by the direct union of its elements in a free state, as many sulphides, chlorides, and oxides (for example) are formed in inorganic chemistry. Their extreme readiness to decompose under the influence of heat, fermentation, putrefaction, &c., is another characteristic of organic compounds, although some artificially prepared inorganic compounds—as, for example, chloride of nitrogen—are also very unstable.

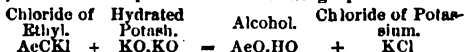
The following scheme may serve to elucidate the arrangement of the elements in organic compounds. Such compounds may be composed of carbon and oxygen, as carbonic oxide,  $C_2O_2$ ; or of carbon and hydrogen, as oil of turpentine,  $C_{10}H_{16}$ ; or of carbon and nitrogen, as cyanogen,  $C_2N_2$ ; or of carbon, hydrogen, and oxygen, as grape-sugar,  $C_{12}H_{22}O_{12}$ ; or of carbon, nitrogen, and oxygen, as anhydrous cyanic acid,  $C_2NO$ ; or of carbon, hydrogen, and nitrogen, as nicotine,  $C_{10}H_{14}N_2$ ; or of carbon, hydrogen, and sulphur, as oil of garlic,  $C_6H_8S$ ; or of carbon, hydrogen, nitrogen, and oxygen, as caffeine,  $C_{10}H_{12}N_4O_2$ ; or of carbon, hydrogen, nitrogen, and sulphur, as oil of mustard,  $C_6H_8NS_2$ ; or finally, of carbon, hydrogen, nitrogen, oxygen, and sulphur, as taurine,  $C_4H_7NO_6S_2$ . Hence organic compounds may be binary, ternary, quaternary, or quinary in their composition.

**ORGANIC RADICALS.** Under the term Organic or Compound Radicals (or Radicles, as some chemists write the word) are included a number of groups of elements, of which carbon is always one, which comport themselves chemically like simple elementary bodies. The careful study of organic compounds led chemists to perceive that many of these contained as a proximate constituent a more or less complex atomic group, which in its combining relations behaves precisely like the elementary substances, and which, like them, may be transferred from one compound to another; and hence the inference was drawn, that all organic compounds were combinations of organic radicals with oxygen, sulphur, hydrogen, or other elements, or of one organic radical with another. In accordance with this view, Liebig defined organic chemistry as "The Chemistry of Organic Radicals." In order to shew how much the theory of organic radicals serves to elucidate the com-

position of organic compounds, and to reduce the laws of organic to those of inorganic chemistry, we will point out some of the chemical analogies between the radical *ethyl* ( $C_2H_5$ ) and the metal potassium (K), and between the radical *cyanogen* ( $C_2N$ ) and the halogen chlorine (Cl). Ae is the symbol for ethyl, and Cy for cyanogen.

KO = Oxide of potassium, or potash.	AeO = Oxide of ethyl or ether.
KO,HO = Hydrated potash.	AeO,HO = Hydrated oxide of ethyl or alcohol.
KO,SO <sub>3</sub> = Sulphate of potash.	AeO,SO <sub>3</sub> = Sulphate of oxide of ethyl.
KCl = Chloride of potassium.	AeCl = Chloride of ethyl.
KS = Sulphide of potassium.	AeS = Sulphide of ethyl.
&c. &c.	&c. &c.
HCl = Hydrochloric acid.	HCy = Hydrocyanic acid.
KCl = Chloride of potassium.	KCy = Cyanide of potassium.
NH <sub>4</sub> Cl = Chloride of ammonium.	NH <sub>4</sub> Cy = Cyanide of ammonium.
HgCl = Chloride of mercury.	HgCy = Cyanide of mercury.
&c. &c.	&c. &c.

Again, if under certain conditions chloride of ethyl is brought into contact with hydrated potash, the reaction expressed in the following equation occurs:



which shews that the ethyl and the potassium may mutually replace one another in compounds; and the same might be similarly shewn of cyanogen and chlorine.

Comparatively few organic radicals have been obtained in an isolated state; and in most cases the existence of any special radical is only inferred from the fact, that the group of atoms of which it is supposed to be composed can be transferred from one elementary substance to another, and can be made to enter into combination with other organic radicals. The existence of ethyl was thus inferred long before the substance itself was isolated, and the radical benzoyl,  $C_{14}H_9O_2$  (symbol, Bz), which exists in the oil of bitter almonds, and on which Liebig specially bases his whole theory of organic radicals, has never been isolated. The simplicity obtained by adopting the radical theory in place of using merely empirical formulas, is well shewn in the two contrasted modes of symbolically representing the compounds which are obtained from this oil:

Empirical Formula.	Rational Formula (Bz = $C_{14}H_9O_2$ ).
Oil of bitter almonds, $C_{14}H_9O_2$ =	BzH, Hydride of benzoyl.
Benzic acid, $C_{14}H_9O_2,HO$ =	BzO, HO, Hydrated oxide of benzoyl.
Chlorine-compound, $C_{14}H_9O_2Cl$ =	BzCl, Chloride of benzoyl.
Sulphur-compound, $C_{14}H_9O_2S$ =	BzS, Sulphide of benzoyl.
Cyanogen-compound, $C_{14}H_9O_2N$ =	BzCy, Cyanide of benzoyl.

The organic radicals are either binary or ternary in their composition. Many of them—as, for example, ethyl—consist of carbon and hydrogen; others, as carbonyl (or carbonic oxide), of carbon and oxygen; others, as cyanogen, of carbon and nitrogen; and others again, like benzoyl, of carbon, hydrogen, and oxygen. Into a few radicals a metallic element enters; these are termed organo-metallic radicals; and cacodyl, which contains arsenic, and is represented by the formula  $As(C_2H_5)_3$  is the best example of this class. All recent works on organic chemistry are based either on the theory of organic radicals or on the more complicated theory of types, which will be noticed in a special article.

ORGANISTA, the common name of a number of small South American birds allied to wrens, and remarkable for the sweetness of their song. The Peruvian O. (*Troglodytes leucophrys* of Tschudi) has a modest, cinnamon-brown plumage, with head and neck of dark olive. "The tender melancholy strains, and the singular clearness of the innumerable modulations, charm the ear of the astonished traveller, who, as if arrested by an invincible power, stops to listen."—Tschudi's "Travels."

ORGANO-METALLIC BODIES. Under this term are included a large number of chemical compounds in which organic radicals, such as methyl ( $C_2H_5$ ), ethyl

( $C_2H_5$ ), &c., are united to metals in the same way as chlorine is combined with zinc, forming chloride of zinc. If, for instance, in chloride of zinc ( $ZnCl$ ) we replace the chlorine by ethyl, we produce one of the bodies belonging to this class—viz., zinc-ethyl,  $Zn(C_2H_5)$ . This substance (which we take as a good example of the class) is obtained by digesting a mixture of equal volumes of iodide of ethyl and ether with granulated zinc, at a temperature of about  $260^\circ$ , for several hours. Subsequent distillation gives a mixture of zinc-ethyl and ether, from which the former may be obtained pure by rectification, in the form of a colorless, transparent, mobile liquid, which refracts light strongly, has a powerful but not disagreeable odor, and is rather heavier than water, its specific gravity being 1.182 at  $64^\circ$ . With the exception of cacodyl,  $As(C_2H_5)_3$ , these bodies are the creation of the last ten or twelve years, during which period numerous compounds of organic radicals with zinc, cadmium, magnesium, antimony, arsenic, bismuth, mercury, lead, sodium, and potassium have been discovered.

For further information on this subject, the reader is referred to an article by Dr Frankland (who has most successfully devoted his attention to this class of compounds) in the 13th volume of "The Quarterly Journal of the Chemical Society," and to an elaborate article on "Organo-Metallic Bodies" (by the same chemist) in "The English Cyclopædia."

**ORGAN-POINT**, or **Pedal-Point**, in Music, a bass note sustained through a series of chords, with only the first and last of which it is in harmony. The sustained note may be the dominant or tonic, and sometimes occupies an upper part instead of the bass.

**ORGA'NZINE**, a name applied to silk which after having been first wound off from the cocoons into hanks, is then placed on a winding machine, which reels off the hanks on to wooden reels. These are then placed on spindles, and the fibres of each are made to pass through a minute orifice and small brush, which together clean the thread and remove any knots or projections from it, throwing it at the same time into hanks again. Then the threads of two hanks are taken, and again reeled off, this time on to one hank, being twisted together *to the left*; then two of these doubled reels are taken, and the ends being laid together, are twisted *to the right*. These operations, consisting of winding, cleaning, throwing, and twice twisting and doubling, constitute organzine silk. See **SILK**.

**O'RGEAT**, a kind of culinary preparation, which is both used as an agreeable syrup to mix in certain drinks, or medicinally as a mild demulcent. It is prepared by making an emulsion of almonds, which are blanched for the purpose, and beaten into a paste in a mortar and then rubbed up with barley-water. The proportions are—1 lb. of sweet and 1 oz. of bitter almonds, to a quart of barley-water. To this emulsion are added 2 lbs. of powdered loaf-sugar, and a quarter of a pint of orange-flower water. There are other modes of making it, but this is the simplest and best. It is much used in France under the name of *Sirap d'Orgeat*.

**O'RGIES** (probably from Gr. *erdo*, in the perfect, *eorga*, to sacrifice), or **Mysteries**, secret rites or customs connected with the worship of some of the pagan deities; as the secret worship of Ceres (q. v.), and the festival of Bacchus, which was accompanied with mystical customs and drunken revelry. The name is now applied to scenes of drunkenness and debauchery.

**ORGUES** are thick, long, wooden beams, pointed and shod with iron, hung vertically by separate ropes in the gateway of and over the entrance to a fortified place. They answer the purpose of a portcullis or door, and are dropped into position by cutting the ropes from which they hang. Their descent is inevitable, in which they possess an advantage over the portcullis, which may be held up by the enemy or blown in by petards, whereas petards have little effect on orgues, for if one beam be destroyed, another can be dropped to fill up the gap.

**O'RIEL COLLEGE**. In 1324, Adam de Brom, almoner of Edward II., procured from the sovereign a charter of incorporation for a college under the name of *St Mary's House*, in Oxford. The origin of the name "Oriel College" is uncertain. It consisted originally of a provost and 10 fellows. The number of fellows was by subsequent benefactions raised to 18, and several exhibitions and scholarships were also founded at various times. By the commissioners under 17 and 18 Vict. c. 81, all the fellowships are thrown open, but two are in the meantime suspended for the

purpose of increasing the number and value of the scholarships, and of augmenting the salary of the professor of modern history. By the same authority the scholars are placed on the foundation of the college, a position they did not before enjoy; the scholarships are made ten in number, tenable for five years, of value £80 per annum, with rooms free. This college was one of the first to throw open such of its fellowships as it could to competition, and hence the fellows of Oriel have long been among the most distinguished men in the university. For several years back, however, its undergraduates have done little in the schools. The fellows divide upwards of £200 a year, in addition to allowances; and the income of the provostship, to which is annexed a living in Essex and a canonry in Rochester Cathedral, is estimated at £3000 a year. There are thirteen benefices in the gift of this college.

**ORIEL WINDOW**, a projecting window having more sides than one, usually three, and commonly divided into bays by mullions. It is one of the most picturesque features in medieval and Elizabethan domestic architecture, and adds much to the convenience of the interior. The word *oriel* (Med. Lat. *ororium*, probably dim. from *os*, *oris*, as if a small opening or recess) formerly meant a chamber or apartment, and a window is so called which makes a small apartment, as it were, off a large room. Oriels are also called Bay or Bow Windows (q. v.).

**ORIENTA'TION**. As Christians from an early period turned their faces eastward when praying, so Christian churches for the most part were placed east and west, in order that the worshippers, as they looked towards the altar, might also look towards the east. Modern observation, however, has found that few churches stand exactly east and west, the great majority inclining a little either to the north or to the south. Thus, of three ancient churches in Edinburgh, it was ascertained that one (St Margaret's Chapel in the Castle) pointed e.s.e.; another (St Giles's Cathedral), e.-by-s.w.s.; a third (Trinity College Church, now destroyed), e.w.s. This deviation from the true east has received, among English ecclesiologists, the name of "Orientation." Its origin or cause has not been satisfactorily explained. Some have supposed that the church was turned not to the true east, but to the point at which the sun rose on the morning of the feast of the patron saint. But, unfortunately for this theory, neighboring churches, dedicated in honor of the same saint, have different orientations. Thus, All Saints' at West Beckham, in Norfolk, points due east; while All Saints' at Thwaite, also in Norfolk, is 8° to the north of east. There are instances, too, in which different parts of the same church have different orientations; that is to say, the chancel and the nave have not been built in exactly the same line. This is the case in York Minster and in Lichfield Cathedral. Another theory is, that orientation "mystically represents the bowing of our Saviour's head in death, which Catholic tradition asserts to have been to the right [or north] side." But this theory is gainsaid by the fact, that the orientation is as often to the south as to the north. Until some better explanation is offered, it may, perhaps, be allowed to hold, that orientation has had no graver origin than carelessness, ignorance, or indifference.

**O'RIFLAMME**, or *Auriflamme* (Lat. *auri flamma*, flame of gold), a banner which originally belonged to the Abbey of St. Denis, and was borne by the Counts of Vexin, patrons of that church, but which, after the county of Vexin fell into the hands of the French crown, became the principal banner of the kingdom. It was charged with a saltire wavy or, with rays issuing from the centre crossways. In later times the oriflamme became the insignia of the French infantry. The name seems also to have been given to other flags; according to Sir N. H. Nicolas, the oriflamme borne at Agincourt was an oblong red flag split into five parts.

**ORIGENES** (ORIGEN), called *Adamantinos* or *Chalchentzos*—both epithets expressive of his firmness of purpose and iron asceticity—one of the most eminent of the early Christian writers, "the father of biblical criticism and exegesis in Christendom," was born 185 A.D., at Alexandria, where his father, Leonidas, seems to have held some superior office in the church. O. received a most liberal education. While, on the one hand, he was initiated at an early age into Hellenic science and art, the teachings of Christianity were instilled into his mind by men like Pantænus and Clemens of Alexandria. During the persecutions against the Christians, instituted by Sept. Severus, his father died the death of a martyr, and O., then 17 years of age, would have shared it of his own free will, had not his mother, left unsupported

with six children, prevented him. After a short time his zeal and erudition procured for him the office of catechist in the Alexandrian church; but no salary being affixed to it, he was fain to dispose of his much-loved collection of classical authors for a daily stipend of four oboli (3d.) for several years. His wants were extremely limited, and his asceticism led him even to self-mutilation (in accordance with the view he took of Matt. xix. 12): an act for which he afterwards expressed the deepest sorrow, and which became a dangerous weapon in the hands of his antagonists. Not a few of his hearers being masters of Greek (Neoplatonic) philosophy, O., in order to ward off more successfully their attacks upon his doctrines, and to combat them on their own ground, applied himself particularly to this science, and Ammonius Saccas himself is said to have been his teacher. From this period also may be dated O.'s transition from unconscious to conscious belief. He examined henceforth, with as little prejudice as possible, all the different systems of human speculations that came under his notice during the many journeys he undertook, proceeding on the principle "that we are not, under the pretence of piety, to pin our faith on that which is held by the multitude, and which therefore alone seems to stand on high authority, but on that which results through examination and logical conclusions from established and admitted truths." This liberality of his mind and doctrines could not fail, on the one hand, to bring about many conversations to the faith, as he taught it, both among "pagans" and "heretics," the latter chiefly of the Gnostic sects; and on the other hand, to raise an outcry among less liberal professors and teachers of the faith, who had not been so successful in their labors. What gave the greatest offence in his teachings was his way of explaining, after the manner of the Midrash, known to him through the Jewish masters (from whom, at an advanced age, he had also learned Hebrew), allegorically and symbolically that which in the Scripture warred with the common human understanding, or seemed repugnant in manner or matter. Furthermore, while upholding all the ethical portions of the Bible, he rejected a great deal of its supposed historical and legal contents for all purposes, save, perhaps, as starting-points for homiletics. "What edification," he says, "could we find in literally interpreting the story of Abraham's first telling Abimelech a lie, and then, with Sarah's consent, handing her over to him and prostituting her?" As to the discrepancies in the different gospels respecting the life of Christ, he says: "One of two only is possible. Either these things are true in a *spiritual* sense only, or as long as the discrepancies are not satisfactorily explained away, we cannot believe in the gospels being dictated by the Holy Ghost, and redacted under the influence of his inspiration."

In 211 he went to Rome, but soon afterwards, at the wish of Bishop Demetrius, he returned to Alexandria, which, however, he was obliged to leave precipitately, and to seek refuge from certain popular tumults in Palestine. Here the bishops received him with great honors, and desired him to institute public lectures, in which they themselves became hearers. Recalled again by the Alexandrian bishop, he was sent to Achaia to combat certain heresies that had broken out there. The wrath that had silently been gathering against him found its first vent when, in 228, the bishops assembled in Cæsarea in Palestine consecrated him presbyter. The Bishop of Alexandria took umbrage at this outrage, as he called it, on his authority. Two councils were convoked, and in 232, O. was deprived of his priestly office, and excommunicated, the principal heresy charged against him being his denial of eternal punishment. Yet the churches of the East remained faithful to him. Palestine, Arabia, Phœnicia, and Achaia remained in constant communication with him; and men like Gregory Thaumaturgus (q. v.), Athenodoros, and others remained or became his faithful disciples ever after, while the Bishop of Cæsarea allowed him openly to expound the Scripture in his church. The persecutions under Maximinus again forced him to seek refuge for two years in Cappadocia. Returning under Gordianus, he resumed his labors and journeys, until, when Decius ascended the throne, he was seized, imprisoned, and tortured for his faith. He did not survive his sufferings long, but died, in 254, at Tyre, where his tomb, near the high-altar of the cathedral, was shewn for many centuries, until it was destroyed during the Crusades.

The number of his works is stated by Epiphanius and Rufinus to have exceeded 6000, and although this is probably only meant as an exaggerated round number, yet the amount of writings that issued from his always busy brain and hands cannot but have been enormous. Seven secretaries and seven copyists, aided by an uncer-

tain number of young girls, are by Eusebius reported to have been always at work for him. The great bulk of his works is lost; but among those that have survived, the most important by far are his two editions of the Old Testament, called respectively "Tetrapla" (*fourfold*) and "Hexapla" (*sixfold*). See *HEXAPLA*. The labor bestowed upon this work must have been immense, and no less than twenty-eight years is O. supposed to have been engaged upon it. On its importance for biblical criticism it is needless to enlarge here. Fragments only have come down to us, the original having been lost during the siege and capture of Cæsarea by the Arabs; and the Greek as well as the Roman clergy having almost laid an interdict upon the copying of any of O.'s much suspected writings. Montfaucou has collected and edited these fragments ("Hexaplorum Origenis quæ supersunt," 2 vols. fol. Paris, 1714), which were re-edited by C. F. Bahrdt (1769—1770). Of his other partly extant, partly lost works, the chief are his books "On the Resurrection," "On Myrtyrdom," "Eight Books against Celsus," "On Prayer," besides Epistles, &c. He further revised and enlarged Philo's Lexicon of Hebrew Names ("Hebraicorum Nominum S. Scripture et Mensurarum Interpretatio"), whence it has often, together with many other spurious works, been ascribed to him exclusively. Little also has survived of his many exegetical writings, commentaries, brief notes, and homilies on both Testaments. The best editions of his collected works are by De la Rue (Radens), (Paris, 1738—1759, 4 vols. fol.); by Oberthür (Wurzburg, 1785—1794, 15 vols.); and by Lommatzsch, which is critical and more complete (Berlin, 1831), &c.

**ORIGINAL SIN.** According to this theological tenet, when stated in its extreme form, men come into the world with the reason and will utterly corrupt. This corruption originated in the fall of Adam, and has been inherited equally by all his posterity, so that the natural man is not only incapable of knowing and loving God and goodness, but is inclined to condemn God and pursue evil; on which account the anger of God has subjected him to temporal death, and destined him to everlasting punishment in hell. The doctrine is founded on the account of the fall given in Genesis, and on some passages in Paul's Epistle to the Galatians, and in that to the Romans; which passages, however, are held by others to contain no such doctrine; and indeed nearly every point in the history of the doctrine is the subject of as much controversy as the details of the doctrine itself. The early church, it is maintained by one school, was unacquainted with it; and the most orthodox admit that the doctrine had not at that time been fully developed. The Christian fathers, Justin Martyr, Clemens Alexandrinus, Irenæus, and others, ascribe to the natural man a certain ability to know God and choose the good, they are said to reject distinctly all propagation of sin and guilt, and even to refer human mortality not to Adam's sin, but solely to the constitution of the body. Origen, on the other hand, in opposition to the Gnostics and Manichees, who grounded the sinfulness of men on the connection of the soul with a material body, asserted that the sinfulness was in existence at birth, but ascribed the development of actual sins and their consequences not to propagation, but to the moral operation of precept and example. He accordingly found the cause of sin to be in the freedom of the will, the abuse of which he explained partly by the operation of evil powers, partly by the predominance of the sensuous part of man's nature over the rational mind. The orthodox teachers of the Greek Church, again, held that Adam, by the fall, rendered himself and all his posterity mortal, but, according to the less rigid schools, they looked for the origin of sin in the freedom of the will acted upon by the flesh, and by demoniacal influences, and ascribed to man the power of resisting every evil if he chose. These views, it is alleged, continued to be held, in substance, by the Christian teachers in the east, and were fully developed by Chrysostom; but Catholic writers maintain that in all this Chrysostom and the other Greek fathers are speaking not of the *natural* powers of the will, but of the will as assisted by divine grace.

The doctrine took another shape in the Latin Church. Tertullian, following up his dogma of Traducianism, according to which the child derives not only its body, but its soul from its parents, maintained that sinfulness had been propagated, along with mortality, from Adam to all mankind; he thus defended an *original vitium*, without conceiving it as actual sin and denying all capacity for good in man. This view was followed by Cyprian, Ambrose, and even by Augustine in his earlier writings. It was only during his controversy with Pelagius and Cælestius that Augus-

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time came to develop the doctrine of original sin into the full form given above. His great influence in the western churches procured the condemnation of his opponents, the Pelagians (q. v.), as heretics at the Councils of Carthage (412, 416, 418), although the Councils of Jerusalem and Diospolis (415) decided in their favor. Building upon the foundation of Traducianism, Augustine laid down that every natural man is in the power of the devil, and upheld the justice of this as a punishment for the share which the individual had in Adam's transgression; for as all men existed in the loins of Adam, all sinned with him. Pelagius, on the other hand, who rejected the Traducian theory, denied that sin is propagated physically, or that the fall of Adam has exercised any prejudicial influence on the moral constitution of his posterity; and maintained that all men are born in a state of innocence, possess the power of freewill, and may therefore live without sin. He and his followers objected to Augustine, that his doctrine was in direct contradiction to clear passages of Scripture, and that it made God the originator of evil and an unrighteous judge.

Great as was the respect for Augustine, the harshness of his doctrine was too shocking to the natural sentiments to meet with lasting acceptance. In the eastern church it never gained a footing, and even in the west it met with opposition. In Gaul, John Cassian, Faustus, Arnobius, and others, took up a view midway between the views of Augustine and Pelagius, from which they were called Semipelagians. They attributed to man a capacity for good which makes it possible for him, not indeed to merit the favor of God, but to make himself capable of receiving it; and maintained that it is only a certain inborn weakness that men inherit from the first pair. The Semipelagian doctrine found acceptance especially among the monks (in particular among the Franciscans), continued to prevail during the middle ages, and among the scholastics found partisans in the Scotists. Augustine's views also found advocates among the scholastic philosophers, who, however, added to it many limitations and explanations. Regarding the way in which original sin is propagated, many held by the Traducian theory, while others conceived it to be a sort of infection of the soul by the defiled body, or an imputation of guilt to all partakers of the human nature. Petrus Lombardus adhered to Augustine. Anselm of Canterbury conceived original sin to be a want of requisite righteousness, and thought that this want was imputed to all the posterity of Adam, although not in the same degree as if they had themselves sinned. Anselm's view was adopted by Duns Scotus, while Bonaventura and Thomas Aquinas sought to combine the opinions of Anselm and Augustine. Anselm had thought that his theory afforded a better explanation of the sinless birth of Christ; and about the 12th c. it began to be maintained that Mary also was conceived without sin.

The reformers of the 16 c. everywhere made original sin a leading doctrine, and thus were enabled to combat effectively the Roman Catholic doctrine of the merit of works; while the Catholic Church, in the fifth session of the Council of Trent, stamped what the Calvinist school would call Semipelagianism as the orthodox doctrine. The reformed churches agreed with the Lutheran on the point of original sin. In this they followed Calvin rather than Zwingli, who looked upon it as an evil or disease, and as becoming sin only when a commandment is transgressed. The Arminians and Socinians, on the other hand, denied the doctrine of hereditary sin in the ecclesiastical sense. The Menonites spoke of a loss of the divine image in consequence of the fall of Adam, but still asserted the freewill of man. The Quakers rejected the name of original sin altogether; they held that there is a germ of sin in man, from which imputable sin springs, and that, however corrupt, he has still the susceptibility of being awakened to the inward light. The whole Protestant Church held, besides, that Jesus alone was from sin, both original and actual. The Roman Catholic Church ascribed this attribute also to Mary, though no public and distinct declaration on the point was given by the Council of Trent. See **IMMACULATE CONCEPTION**.

The harshness of the Augustinian dogma led, at the time of the Reformation, to keen controversies; Erasmus disputed the point with Luther, and would only admit a weakness of the freewill arising from original sin, and by no means a complete annihilation of it. From that time the doctrine in Germany continued to be variously attacked and defended. It has been discussed by the schools of philosophy. Kant shewed the moral insignificance of the dogma, and made out original sin to be a propensity to evil inherent in man. The Schelling-Hegel school, again, explained

It as the finite nature with which the individual is born. In recent times, the theologians of the old Lutheran and strictly orthodox tendencies, such as Olshausen, Tholuck, Hengstenberg, and others, have come forward as adherents and defenders of the Augustinian doctrine; while the more liberal theologians modify it in various ways, not admitting any moral inborn corruption arising from the fall, but only a weakness in man's nature for the knowledge and performance of good. How far, and with what differences, the extreme Augustinian view is held by the churches of England and Scotland, will be seen from the following extracts from the "Thirty-nine Articles" and the "Westminster Confession of Faith."

From Art. ix. of the "Thirty-nine Articles": "Original sin standeth not in the following of Adam (as the Pelagians do vainly talk); but it is the fault and corruption of the nature of every man, that naturally is engendered of the offspring of Adam, 'whereby man is very far gone from original righteousness,' and is of his own nature inclined to evil, so that the flesh lusteth always contrary to the spirit; and therefore in every person born into the world, it deserveth God's wrath and damnation."

From chap. vi. of the "Westminster Confession": "By this sin" (i. e., the eating of the forbidden fruit), "they" (i. e., our first parents) "fell from their original righteousness and communion with God, and so 'became dead in sin, and wholly defiled in all the faculties and parts of soul and body.' They being the root of all mankind, the guilt of this sin was imputed, and the same death in sin and corrupted nature conveyed to all their posterity, descending from them by ordinary generation. From this original corruption, 'whereby we are utterly indisposed, disabled, and made opposite to all good, and wholly inclined to all evil,' do proceed all actual transgressions."

ORIHUEÑA, an ancient town of Spain in the modern province of Alicante, and 26 miles south-west of the city of that name, stands on the banks of the Segura, in a plain remarkable alike for its beauty and its fertility. It is long and straggling, while its palm-trees, square towers, and domes give it an oriental appearance. It contains a cathedral, numerous churches and convents, barracks, &c. The manufactures are linen goods and hats, and many corn and oil mills and tanneries are in operation. Olive oil is very extensively made. The vegetation here is gigantic; the oleanders are actual trees. O. has been possessed by Carthaginians, Romans, Moors, and Spaniards in turn. Pop. 24,000.

ORILLON, in Fortification, and especially in the earlier systems, is a semicircular projection at the shoulder of a bastion, intended to cover from the observation of the enemy the guns and defenders on the flank, which, with such a construction, is somewhat retired or thrown back. The flank thus protected is held by many distinguished engineers to be most valuable in the defence of the ditch, in clearing it from an attacking party, or from hostile miners. The retired flank is sometimes straight, at others curved. The orillon is as old as the bastion, and is found in the works of Pagan and Speckle.

ORINOCO, a great river of South America, flows through Guiana and Venezuela, and reaches the Atlantic Ocean south of Trinidad, in lat. 8° 40' n. The country in which it takes its rise is inhabited by an aboriginal race called the Guinicas, who have hitherto prevented all access by foreigners to its sources; but it is known to rise in the Sierra Parime, one of the chief mountain chains of Guiana, near lat. 3° 40' n., long. 64° 30' w. It has been explored by Humboldt to the village of Esmeraldas (lat. 3° 8' n., long. 66° 5' w.), and by Schomburgk to within 30 miles of its source. After flowing west-south-west 30 miles past Esmeraldas the river bifurcates, and the southern branch, the Cassiquari (q. v.), flowing south-west, joins the Rio Negro, an affluent of the Amazon. From this point the O. flows north-west to its junction with the Guaviare, then north-north-east to its junction with the Apure, after which it flows in an eastward direction to its mouth. Length of course, 1960 miles. The head of uninterrupted navigation is at the confluence of the O. with the Apure, 777 miles from the mouth of the river. Above this point the course of the river is interrupted by "ranchals" or cataracts, of which those of Maypures and Atures are the most celebrated. Its principal affluents from the left are the Guaviare, the Vichada, the Meta, and the Apure; from the right, the Ventuari, Caura, and Caroni. The O., which is joined by 486 rivers, and upwards of 2000 streams, drains an area (usually stated at 250,000 square miles) which, according to Wappau's "Republikon von Sud-



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Amerika," may be estimated at 650,000 square miles. It begins to form its delta 130 miles from its mouth, by throwing off a branch which flows northward into the Atlantic. Several of the mouths are navigable, and the main stream, the Boca de Navios, is divided by a line of islands into two channels, each two miles in width. Bolivar, a town upwards of 250 miles from the mouth of the river, marks the head of tide-water, and here the river is 4 miles wide and 390 feet deep. Below the junction of the Apure the character of the scenery seems to be uniform—forests on the right bank, and llanos on the left.

**O'RIOLE** (*Oriolus*), a genus of birds of the Thrush family (*Merulidae* or *Turdidae*), having an elongated conical beak, broad at the base; the upper mandible ridged above, and notched at the point; wings of moderate size, the first feather very short, the third the longest; the tail of moderate length, and rounded; the tarsus not longer than the middle toe; the outer toe joined at its base to the middle toe; claws strong and curved. The species are numerous, all natives of the Old World, and chiefly of the warmer parts of it; the adult males generally of much brighter plumage than the females and young males, the prevalent color yellow. Only one species is found in Europe, the **GOLDEN O.** (*O. galbula*), pretty common in Italy and some other parts of Europe, but a rare summer visitant of England, and never seen in Scotland, although it occasionally breeds in the south of Sweden.—The name **O.** is still very commonly given to the Baltimore Bird (q. v.), and other American birds of the Starling family, the chief resemblance of which to the true orioles is in color.

**ORI'ON**, in Greek Mythology, was a gigantic hunter, and reputed the handsomest man in the world. His parentage is differently given. According to the commonly received myth, he was the son of Hyrieus of Hyria, in Boeotia, and was called in his own country Kandaon. Another account makes him a son of Poseidon and Euryak, while some state that he was *Autochthonos*, or "earth-born." So immense was his size, that when he waded through the deepest seas he was still a head and shoulders above the water; and when he walked on dry land, his stature reached the clouds. Once on a time he came to Chios, in the Ægean Sea, where he fell in love with Eero or Merope, daughter of Œnion. He cleared the isle of wild beasts, and brought their skins as presents to his sweetheart; but her father always put off their marriage; whereupon O., one day giving way to passion (when under the influence of wine), sought to take the maiden by force. Œnion now called upon Dionysus (Bacchus) for help, who put out the eyes of the inebriate lover. O., however, recovered his sight in Lemnos, by following the advice of an oracle, and returned to Chios to take vengeance on Œnion. Not finding him, he went to Crete, where he spent the rest of his life hunting in company with Artemis (Diana). The cause and manner of his death are differently related. Artemis, say some, slew him with an arrow, because Koo, inflamed by his beauty, had carried him off to Ortygia, and thereby offended the gods. Others aver that Artemis, virgin-goddess though she was, cherished an affection for him, that made her brother Apollo fiercely indignant. One day, pointing out to her at sea a black object floating in the water, he told her that he did not believe she could hit it. Artemis, not recognising her favorite, drew her bow, and pierced him through the head: a third myth makes him find his death from the sting of a scorpion. Asklepios (Æsculapius) wished to restore him to life, but was slain by a bolt of Zeus. After his death, O. was placed with his hound among the stars, where, to this day, the most splendid constellation in the heavens bears his name.

**ORI'SSA**, an ancient kingdom of Hindustan, the authentic history of which goes back to 478 A.D., extended from Bengal—a part of which it included—on the n., to the banks of the Godavari on the s., and from the coast on the e. to the river Godwana on the w. From its remains of sculptures, inscriptions, &c., we may infer that its earliest civilisation was high. The temple of the sun at Kunârek—erected about the 12th c.—exhibits carvings representing the planets, sculptured figures of animals, &c., which shew that at that date the plastic and mechanical arts were in a more advanced state in O. than they were in England. It maintained its position as an independent monarchy till 1553, when, its royal line having become extinct, it became an outlying province of the empire of the Great Mogul. On the breaking up of this empire, the more valuable portions of O. were seized by the Nizam of Hyderabad. The French, who had taken possession of a part of the country long known as the Northern Circars, attempted to drive the English (who had also formed commercial

settlements on the coast) out of India. The result of the contest for supremacy in India between the French and English is well known. The Mahrahtas, who had seized a portion of O. in 1740, were forced to surrender it to the English in 1803. The soldiers of the East India Company were marched into O. at the commencement of the present century, and an engagement was subsequently entered into between the Company and the native chiefs and princes, by which the former bound themselves to perform certain services for the country (as maintaining the river-banks in good repair), while the latter engaged to pay a yearly tribute. Of the many principalities into which O. was divided, a large number got into arrears with the government, and the result was that numbers of the estates were sold, and the government, as a rule, became the purchaser. Much of the territory originally forming a portion of this kingdom thus fell into the hands of the British. The ancient O., which existed as an independent monarchy for four centuries, and flourished as a principality of the Mogul empire after 1538, is now hardly to be recognised in the British commissionership of O., with an area of 23,901 sq. m., and a pop. of (1872) 4,317,999. This country was decimated by famine in 1868-69; and careful surveys of its coast were made in 1870. O. is traversed by a branch of the Eastern Ghats running parallel with the coast. The hill-districts, which nowhere present an elevation of more than 3000 feet, are inhabited by the Gonds, the Koles, the Sourahs, and the Khonds. The Khonds occupied an area extending from north of the Mahanaddi, south to the banks of the Godavari. Their mountain-haunts are admirably suited for defence, as the districts which they inhabit are almost inaccessible; and although they do not yet appear to have adopted firearms, they manage their battle-axes and bows and arrows with an adroitness and courage that make them formidable enemies. The Khonds are a totally distinct race from the inhabitants of the plains, and there is but little resemblance between them and the other hill-tribes, the Gonds and Sourahs. The chief peculiarities of the Khonds are, that their language, which is quite distinct from those of the neighboring tribes, is not in the least understood by the inhabitants of the plains; and that human sacrifice formed, till within the last few years, one of the distinguishing features of their religion. They do not harter or traffic, and all commercial transactions are managed for the Khonds by the Pannas, Doms, &c., regarded by their employers as inferior races. There are, however, no caste prejudices among the Khonds such as generally prevail throughout the plains of India. Agriculture and war are the only employments. The revolting custom of human sacrifice prevailed among the Khonds from the earliest times, although it was not till 1836 that the attention of the government was specially called to the subject, at the conclusion of an insurrection, in the course of which British officers had been brought into contact with the Hill tribes. The Khond victims, called Meriah, were always bought with a price, sometimes from families of their own tribes, who had fallen into poverty, but generally kidnapped from the plains by miscreants of the Pannu race. The Meriah victims were of both sexes, and of every age; though adults were held in the highest esteem, because, being the most costly, they were supposed to be more acceptable to the deity. The object of the sacrifice was to propitiate the earth-god; and abundant crops, security from calamity, and a general prosperity were supposed to be insured to any one who had cut off a portion of the flesh of the human victim, and buried it in his farm. The consummation of the Meriah sacrifice was often attended with circumstances of the most revolting and disgusting cruelty. In some cases the event was preceded by a month's feasting, intoxication, and dancng round the Meriah. On the day before the sacrifice, the priest thus addressed the victim: "We have bought you with a price, and did not seize you; now we sacrifice you according to custom, and no sin rests with us." On the following day the victim was made senseless from intoxication, and then suffocated; after which the officiating priest cut a portion of the flesh from the body, and buried it as an offering to the earth-god. The people following his example, hewed the flesh from the bones, and carried the bloody trophy to their distant villages, where it was buried. In many cases the victim was not intoxicated before sacrifice; but the joints of his arms and legs were broken with a hatchet, in order to prevent the possibility of resistance. In 1837, General (then Captain) Campbell was appointed assistant-collector in Ganjam, the adjoining district in the plains, and with varied success devoted much of his time to endeavoring to suppress the rite. He was succeeded in 1841 by Major (then Lieutenant)

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Macpherson, C.B. Encouraged by the success of his labors, the government in 1845 established, under Macpherson, a separate agency for the suppression of Meriah sacrifices in the Hill tracts of O., in which he was succeeded in 1847, by Major-general Campbell, who carried on, with undiminished success, the good work commenced by Macpherson, pushing his inquiries and exerting his authority among tribes unvisited by his predecessor; and reports have been sent in from all parts of the country, stating that for several years hardly any Meriah sacrifices have taken place in the great Hill tract of Orissa. In the year 1852-1853, all victims retained for sacrifice were demanded, and in only one instance had the demand to be followed up by force. The practice of female infanticide, in this district at one time dreadfully common, to which attention was first called by Major Macpherson, has now also become almost wholly suppressed.

See "Report by Lieutenant M'Pherson," 1841; "An Account of the Religion of the Khonds in Orissa, taken in the Traus. of Asiatic Societies," 1851; Campbell's "Personal Narrative of service amongst the Wild Tribes of Khondistan," 1864; "Calcutta Review," Nos. IX., XI., XV., and XX.; Kaye's "History of the Administration of the E. I. Coy.," 1833; "Memoir: Administration of India during Last thirty Years," 1858; "Indian Records—History of the rise and Progress of the Operations for the Suppression of Human Sacrifice and Female Infanticide in the Hill Tracts of Orissa," (1854); and "Orissa," by W. W. Hunter, Director-general of the Statistical Survey of India, (1872).

ORISTANO, a town, and inferior river port on the west coast of Sardinia, 56 miles north-west of Cagliari. It stands in a fruitful, well-cultivated plain, about a mile from the left bank of the Tirso or Oristano, and 3 miles from its mouth in the Gulf of Oristano, which is about 10 miles in length, with a breadth of 5 miles. It is surrounded by ancient walls flanked with towers; contains a cathedral with a great clock tower, the most conspicuous object in the town; an archbishop's palace, college, and several churches and convents. It carries on manufactures of ironware, cutlery, and agricultural implements, and a number of its inhabitants are engaged in the tunny fishery on the coast. Corn, salt fish, and the wine of Vernaccia are exported. In winter the town is busy and lively; but in summer it is unhealthy, and during that season all who can afford to do so, leave it. Pop. 2500.

ORIZABA, a town of Mexico, in the state of Vera Cruz, 70 miles west-south-west of the town of that name, and 25 miles south of the volcano of Orizaba. The vicinity is unusually fertile, and is covered with forests. The town contains numerous churches, a high school, and an extensive cotton spinning factory. Coarse cloths and tobacco are largely manufactured, and there is much general industry. Pop. 15,000.

ORKNEY ISLANDS, which, with Shetland, form one county, separated from Caithness by the Pentland Firth (q. v.), lie between 56° 41' 24" and 56° 25' 2" N. lat., and between 2° 22' 2" and 3° 25' 10" W. long.; and are 73 in number at low-water, of which 23, besides Pomona, or the Mainland, are inhabited. The area of the O. I. is 610 square miles, or 390,147 imperial acres. The surface is very irregular, and the land is indented by numerous arms of the sea. The highest hill is the Ward of Hoy, 1555 feet. The rocks are of the old red sandstone formation, except a small granitic district near Stromness. Previous to the middle of last century, the agriculture of Orkney was, in more than an ordinary degree for the time, in a primitive state. There was little communication then with the mainland, and improvements were slowly adopted. The spinning-wheel, for instance, was not introduced there for half a century after it was in use elsewhere. Until towards the end of last century, little advance seems to have been made in the management of the land, the inhabitants deeming it more important and profitable to direct their attention to the manufacture of kelp. The people used to suffer periodically from bad seasons and violent storms, when less help could be afforded to them from without. In 1778, a great hurricane of four hours' duration drove the sea-spray over the islands. The grain crop was in consequence sea-gusted, and rendered almost worthless, and there required to be imported 18,000 bolls of meal and bere, besides other articles, costing £15,000, or nearly twice the gross rental of the county. Orkney was formerly divided into 32 parishes, having 8 parish ministers. It now contains 23 parishes, forming 8 presbyteries and 1 synod. There are also about 80 congregations belonging to the

Free and United Presbyterian Churches, besides 8 Independent, and one or two others.

The temperature of Orkney is comparatively mild, considering its northern latitude. This arises partly from its being surrounded by the sea, but chiefly from the neighborhood of the Gulf Stream to the western shores. For the 18 years ending 1869, the mean annual temperature was  $46^{\circ}$ ; the mean temperature of January and February, the coldest months,  $39^{\circ}$ ; and that of July,  $55^{\circ}$ . The annual rainfall varies from about 28 inches on the east side of the Isles to 37 inches on the west.

The carrying-trade and merchandise of Orkney have greatly increased of late years. The exports rose from £49,308 in 1848 to £181,483 in 1861. According to a carefully prepared return in connection with a Piers' Bill, the value of exports, in 1871, exceeded £250,000. The exports are chiefly of fish and agricultural produce, of which cattle are the principal.

The total acreage in 1875 under all kinds of crops, bare fallow, and grass, was 93,615; barley and bere, 5601 acres; oats, 29,549 acres; turnips, 12,301 acres; potatoes, 3151 acres. The number of horses in 1875 was 5614; cattle, 25,762; sheep, 31,693; swine, 4156. The number of occupants of land was 3147.

The chief towns are, Kirkwall (q. v.), the capital (situated in Pomona), and Stromness, in which there are 8 distilleries, producing upwards of 20,000 gallons of whisky annually; but Kirkwall is the only royal burgh in the shire. The valued rent of the O. I. in 1653 was £57,149 Scots, or £4763 sterling. The valuation (exclusive of the burgh of Kirkwall) in 1875-76 was £80,284. In 1871, inhabited houses in the O. I., 6283; pop. 31,274. Constituency returning a member of parliament, with Shetland, in 1875-76, 1281.

The Orkneys, under the name *Orcades* [whence the modern adjective, *Orcadian*], are mentioned by the ancient geographers, Pliny, Ptolemy, Mela, and by other classical writers, but of their inhabitants we know almost nothing till the dawn of the Middle Ages. They were most probably of the same stock as the British Celts. From an early period, however, the Nor-men resorted to these islands, as a convenient spot from which to make a descent on the Scotch and English coasts. In 876, Harald Haarfager conquered both them and the Hebrides. During the greater part of the 10th c., they were ruled by independent Scandinavian jarls (earls), but in 1093 they became formally subject to the Norwegian crown. Thus they remained till 1468, when they were given to James III. of Scotland as a security for the dowry of his wife, Margaret of Denmark. The islands were never redeemed from this pledge; and in 1560, on the marriage of James I. with the Danish Princess Anne, Denmark formally resigned all pretensions to the sovereignty of the Orkneys. During their long connection, however, with Norway and Denmark, all traces of the primitive population disappeared. The present proprietors of land are chiefly of Scotch descent; and the inhabitants generally are a mixed race of Scandinavian and Scotch descent.

ORLE, in Heraldry, one of the charges known under the name of sub-ordinaries, said to be the diminutive of a Bordure (q. v.), but differing from it in being detached from the sides of the shield. It may be the sole charge in a shield. Or, an orle gules was the coat borne by John Balliol. An orle of heraldic charges of any kind denotes a certain number (generally eight) of these charges placed in orle, as in the coat of the old Scottish family of Gladstones of that ilk; argent, a savage's head couped, distilling drops of blood proper, thereon a bonnet composed of bay and holly leaves all proper, within an orle of eight martlets sable.

ORLEANS, an important commercial town of France, capital of the department of Loiret, and formerly capital of the old province of Orlennais, which now forms the greater part of the departments of Loiret, Eure-et-Loir, and Loir-et-Cher, is situated on the right bank of the Loire, here crossed by a bridge of 9 arches, and is 75½ miles south-south-west of Paris by railway. Close to the city is the Forest of O., one of the largest in the country, consisting of 94,000 acres, planted with oak and other valuable trees. O. stands on the verge of a magnificent plain sloping toward the Loire, and watered by the Loire and Loiret, and is surrounded on the land-side by a wall and dry ditches, on either side of which there are pleasantly shaded boulevards. Around it are eight prosperous and populous suburbs. Among its principal buildings are the cathedral, with two lofty and elegant towers, one of the finest

Gothic edifices in the country; the tower; bishop's residence; the houses of Joan of Arc, of Agnes Sorrel, of Diane de Poitiers, of François I., of Pothier; the churches and hospitals, which are numerous; the *musée*, theatre, &c. The town contains three statues of Joan of Arc, of which the equestrian one was inaugurated in 1855. The situation of the town has many commercial advantages, arising from its position on a navigable river, on lines of railway which connect it with Paris and the great trading towns in the south of France, and on the canal which connects the Loire with the Seine. Hosiery, cotton and linen goods, refined sugar, vinegar, bleached wax, leather, &c., are manufactured; and the trade is chiefly in stockings, sheepskins, wine, brandy, corn, and sugar. Pop. (1873) 45,205.

O., originally called *Genabum*, afterwards *Aurelian* (probably from the Emperor Aurelian), of which the modern name is only a corruption, was besieged by Attila in 451, but relieved by the Romans, who here defeated Attila. It afterwards passed into the hands of the Franks, was taken by the Northmen in 855, and again in 963. In 1428, it was besieged by the English under the Duke of Bedford, but was delivered from the besiegers by the inspiring exertions of Joan of Arc (q. v.), who on this account is also named the Maid of Orleans. During the religious wars of the 16th c., O. suffered severely, as also during the war 1870-71.

ORLEANS, House of. See BOURBON.

ORLEANS, Jean Baptiste Gaston, Duc d', third son of Henry IV. of France and Marie de' Medici; was born at Fontainebleau, 25th April 1608. He possessed tolerable abilities, but his education was neglected. On his marriage with Marie of Bourbon, Duchess of Montpensier, in 1626, he received the duchy of Orleans as appanage. His wife soon died, leaving one daughter, the celebrated Mademoiselle de Montpensier. His brother, Louis XIII., regarded him with dislike as heir-presumptive to the throne, the queen having no children; and the treatment which he received at the hands of the king and of Richelieu led him to join with his mother in attempting the overthrow of that minister. He left the court with a number of other great nobles in February 1631; sought the support of the Duke of Lorraine, whose sister he married; and raised in the Spanish Netherlands a corps of 2000 men, at the head of which he crossed the French frontier, assuming the title of Lieutenant-general of the Kingdom; but was completely defeated by Marshal Schomberg at Castelnaudary, and fled to the Duke of Lorraine, whom he thereby involved in ruin. In 1634, however, he returned to the French court. Richelieu sought to have his marriage with Margaret of Lorraine declared invalid, but after a long struggle, and much disputing among jurists and theologians, its validity was sustained. The duke was, however, again obliged to leave France in consequence of fresh intrigues against Richelieu. After Richelieu's death, a reconciliation was effected between him and his brother, the king, by the ministers Mazarin and Chavigny; and Louis XIII. appointed him Lieutenant-general of the kingdom during the minority of Louis XIV. Mazarin and the queen-mother, Anne of Austria, attempting to assume all power to themselves, the duke placed himself at the head of the Fronde (q. v.); but with his usual vacillating weakness and selfish sacrifice of his friends, soon made terms again with the court. Yet, when Mazarin returned from banishment in 1653, the duke again assembled troops for the Prince of Condé, upon which account, after the disturbances were ended, he was confined to his castle of Blois, where he died on 2d February 1660. He left three daughters by his second marriage.

ORLEANS, New. See NEW ORLEANS.

ORLEANS, Philippe, Duc d', regent of France during the minority of Louis XV., was the son of Philippe, Duc d'Orleans, and the grandson of Louis XIII., and was born 4th August 1674. He possessed excellent talents, and made unusual attainments both in science and belles lettres; but his tutor, Cardinal Dubois (q. v.), did not scruple to minister to the strong passions of the young prince, and exercised a most pernicious influence over him. He gave himself up to debauchery. The king compelled him to marry Mademoiselle de Blois, his daughter by Madame de Montespan. He astonished and alarmed the court by protesting against his exclusion by the testament of Charles II. from all right of succession to the throne of Spain, and by the attention which he immediately began to give to military and political affairs. His military talents, however, led to his employment in the wars in Italy and in Spain; but his presence in Madrid after his victories was regarded with apprehension both

by Philip V. and by Louis XIV. He had, indeed, formed the design of taking possession of the Spanish throne for himself. In consequence of this, he lived for some years in complete exile from the court, and much dreaded by it; spending his time both in vicious excesses, and in the cultivation of the fine arts and the study of chemistry. This study afforded a pretext to Madame de Maintenon and her party for accusing him of poisoning the dauphin and others of the royal family, who died suddenly, in rapid succession, of malignant fever, in 1711. The king refused an investigation which the duke demanded. Louis, having legitimised his sons, the Duke of Maine and the Count of Toulouse, appointed the Duke of Orleans only president of the regency and not regent, giving the guardianship of his youthful heir and the command of the household troops to the Duke of Maine; but all this was set aside at his death, and the Duke of Orleans became sole regent. He was popular, and his first measures increased his popularity; but the financial affairs of the kingdom were perplexing, and the regent's adoption of the schemes of Law (q. v.) led to disastrous results. Meanwhile, on the 26th August 1718, he held the celebrated *Lit de justice*, in which he prohibited the parliament of Paris from meddling with financial or political affairs, and declared the legitimised sons of Louis XIV. incapable of succeeding to the throne. Dubois, who still possessed an unhappy influence over his former pupil, became prime-minister, and eventually ruler of France; the regent, who was really a man of far higher abilities, neglecting all duties, and pursuing a course of profligacy almost unequalled in the worst instances of antiquity. His eldest daughter, the Duchesse de Berry, followed his example, and brought herself to an early grave. Dubois, wishing to be made a cardinal, persuaded the regent to sacrifice the Jansenists, and to compel the parliament in 1722 to recognise the bull "Unigenitus" (q. v.). After the king's coronation, 15th February 1723, and the death of Dubois in August, the Duke of Orleans, although disliking public affairs, consented to become prime-minister; but died on the 2d December of the same year, physically exhausted by his incessant debauchery. The influence of his religious and other opinions, and the example of his immoralities, powerfully tended to promote that state of things which eventually produced the horrors of the French Revolution.

ORLEANS, Louis Philippe Joseph, Duc d', born April 13, 1747, was the great-grandson of the preceding. He possessed very good abilities; but early fell into the grossest debaucheries, in which he continued to the end of his career. Louis XVI. disliked him on account of his debased character, and the queen for his obtrusiveness. He became gradually estranged from the court, sought popularity and obtained it, and embraced the cause of American independence. In the assembly of Notables in 1787 he declared against the ministerial proposals; and when the king sought to overcome the resistance of the parliament by a *Lit de justice*, he protested against the proceeding. On the assembly of the States-General, he took the popular side, and voted with the extreme left in the National Assembly; seeking at the same time to please the populace by profuse expenditure, with the hope of being made Lieutenant-general of the Kingdom, or perhaps of opening for himself a way to the throne. When the insurrectionary movements began in Paris in 1789, he promoted them by secret agents and money. The court sent him on an ostensibly diplomatic mission to England, from which he returned after more than six months' absence, in July 1790, and unscrupulously engaged in new intrigues hostile to the king. But he began to find that he himself was made the mere tool of a party, who availed themselves of his influence and wealth for their own purposes, and this discovery cooled his revolutionary fervor. He withdrew from the Jacobin Club, was reconciled to the king, and appeared at court; but was treated with such disrespect by the courtiers, that he turned away, and from that time followed in blind rage the stream of the revolution. He joined Danton's party, was concerned in insurrections, disclaimed all pretensions to the throne, renounced his titles, assumed the name of Philippe Egalité, was addressed as Citizen Egalité, and was returned by the department of Seine and Marne to the National Convention, in which he took his place among the Mountain party. He voted for the death of the king, being, it is said, himself threatened with death by the Jacobins if he should do otherwise, but alleging his sense of duty and his belief that every one who did anything contrary to the sovereignty of the people deserved death. The vote was received with a cry of disgust, and by no means increased the safety of his own position. The Mountain party

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were dissatisfied with him, because he did not give up the whole of his immense wealth for party purposes. After the desertion of his son, the Duke de Chartres (see LOUIS PHILIPPE), the decree for the imprisonment of all the Bourbons was applied to him. He was thrown into prison with his family in Marseille, and was brought before the tribunal of the department of Bouches de Rhône on a charge of high treason. He was acquitted, but the Committee of Public Safety immediately brought him before the Revolutionary Tribunal in Paris; and on the 6th of November 1793 he was condemned, and on the same day executed amidst the execrations of the multitude which had so often applauded him.

**ORLEANS CLOTH**, a kind of stuff made for ladies' dresses, in which the warp is of cotton and the weft of worsted. It is so called from having been first made at Orleans in France, but it is now extensively manufactured at Bradford in Yorkshire.

**ORLOFF**, or Orlov, a Russian family that first rose to eminence during the reign of Paul III., when one of its members, Count Gregori O., attracted the notice of the Grand Duchess Catherine, afterwards the Empress Catherine II., and succeeded Potemkin as her favorite. It was Gregori who planned the murder of Peter III., and his brother Alexis who committed the deed, and both received high honors and rich rewards for this and other services. The flourishing family of the Counts Bobrinski resulted from Gregori's intercourse with the empress. The legitimate line of O. soon became extinct; but Feodor, a brother of Gregori and Alexis, left four illegitimate sons, one of whom, Mikail, distinguished himself in the campaign of 1814; and another was Count Alexei O., the celebrated diplomatist. Count Alexei was born in 1787, signalled himself by courage and military talents during the French wars, negotiated the treaties of Adrianople (1829) and Uukiar-Skelessi (1833), and represented Russia at the London conference of 1833 on the affairs of Belgium and Holland. In 1844, he was placed at the head of the secret police; and the ability and energy with which he directed its vast machinery, rendered him the most dreaded official in Russia. He was high in the favor of the Emperor Nicholas, who employed him in the negotiations with Austria previous to the Crimean war. In 1856, he sat in the congress of Paris as the representative of Russia, and on his return was made president of the grand council of the empire. He died at St Petersburg, 20th May 1861.

**O'ROLOP** (Dutch, *overloop*, that which runs over, or covers), in ships of war, is the lowest deck, immediately above the hold. It contains the magazine, bread-room, and various store-rooms; and is used in time of action for the reception and treatment of the wounded, as, from being below the water-line, it is the safest part of the ship.

**ORME'S HEAD**, Great, a headland in the north-east of Caernarvonshire, North Wales, five miles north-north-west of Conway, is an enormous mass of limestone rock, surmounted by a light-house, and forming the extreme point of the western shore of Orme's Bay. Lat. 53° 20' N., long. 5° 51' W.—Little Orme's Head forms the eastern extremity of the same bay.

**ORMOLU** is a variety of brass, consisting of zinc 25 parts, and copper 75 parts, which has a nearer resemblance in color to gold than ordinary Brass (q. v.). It is extensively used for castings of ornaments for furniture, candelabras, and such articles. When the casting is made, its color is brought out by a *pickle* of dilute sulphuric acid, after which the acid is removed by water, and a liquor varnish is put on to keep it from tarnishing.

**ORMOND**, James Butler, Duke of, was the first of the ancient Anglo-Irish family of Butler on whom the ducal title was conferred. The family was of illustrious antiquity. Genealogical legend carried it back to the dukes of Normandy before the Conquest, and it is certain that at the dawn of the 18th c., it held the hereditary office of royal cup-bearer or *butler*, whence the family name.—The subject of the present article was born in London in 1610. His father, the son of the celebrated Walter, Earl of Ormond, was drowned in crossing the Channel; and the old earl having incurred the displeasure of the king, James I., and being thrown into prison, James, who on his father's death became, as Viscount Thurles, the heir of the title, was seized as a royal ward, and placed under the guardianship of the Archbishop of

Canterbury. On the restoration of his grandfather to liberty, he also was released; and in his twentieth year he married his cousin, Lady Elizabeth Preston, and in 1632 succeeded, upon his grandfather's death, to the earldom and estates of Ormond. During the Strafford administration in Ireland, O. distinguished himself so much, that on Strafford's recall he recommended O. to the king; and in the rebellion in 1640, O. was appointed to the chief command of the army. During the troubled times which followed, he conducted himself with undoubted ability, although, as a necessary consequence of the numberless divisions and subdivisions of party which then prevailed in Ireland, he failed to satisfy any one of the conflicting sections; and when, in 1643, he concluded an armistice, his policy was loudly condemned as well by the friends as by the enemies of the royalist party in England. During the long contest of Charles with the parliament, O. continued to uphold the royal interest in his Irish government; and when the last crisis of the king's fortunes came, he resigned his Irish command, and retired to France, from which country he again returned to Ireland with the all but desperate design of restoring the royal authority, and after a galling but unequal struggle, was compelled, in 1650, to return once more to France. His services to the royal cause continued unremitting during his exile; and at the restoration he accompanied Charles II. on his return, and was rewarded for his fidelity by the ducal title of Ormond. His after-life was less eventful, although he twice again returned to the government of Ireland. It was in 1679 that the well-known attempt was made by the notorious Colonel Blood (q. v.) upon the life of Ormond. As he was returning from a civic festival, he was attacked by Blood and a party of ruffians, and was dragged from his coach with the intention of his being hanged at Tyburn. The attempt drew additional interest from its being commonly supposed to have been instigated by the profligate Duke of Buckingham, O.'s inveterate foe. He escaped uninjured, and lived till the year 1688. His letters and other papers are full of deep historical interest. See Carte's "Life of Ormond."

**O'RMASKIRK**, a market town of England, in Lancashire, in the centre of a rich and populous agricultural district, 12 miles north of Liverpool by the Lancashire and Yorkshire railway. The parish church has both a tower and spire. Its grammar-school has an annual income from endowment of £160. Silk-weaving, ropemaking, basket-making, and brewing are the principal branches of industry. There are large collieries in the vicinity. Pop. (1871) 6127.

**ORMUZ**, or Hormuz, a small island in the strait of the same name, at the entrance of the Persian Gulf, and within ten miles of the Persian coast. It is about twelve miles in circumference, and belonged to the Imam of Muscat till 1854. In the 16th c. it was taken by the Portuguese, and being made by them an entrepôt for goods from India, Persia, and Turkistan, it became important, and the town of the same name rose in population until it had 40,000 inhabitants. The town was demolished, in 1622, by Shah Abbās, assisted by the English, and its trade was removed to Gombroon (q. v.).

**ORMUZD** (Ahurmazd, Auramazda, Hormazd, Ormazd), corrupted from Ahur-Mazdā, i. e. that Ahura (Vedic Asura) or "Spiritual Being," who is called Mazdā (i. e. Vedic Medhās) — "Creator of all things;" the name of the supreme deity of the ancient Persians, and of their descendants the Guebres and Parsees. It was at first emphatically employed in this sense by Zoroaster, or Zarathustra Spitama. O. is, according to Zoroaster's original doctrine, the creator of the earthly and spiritual life, the lord of the whole universe, in whose hands are all creatures. He is the light and the source of light, the wisdom and the intellect, and is in the possession of all good things, such as "the good mind," "immortality," "wholesomeness," "the best truth," "abundance," &c.; which gifts he bestows upon the pure in thoughts, deeds, and words, while the wicked are punished by him according to their wickedness. ("For thou art through purity, the holy over the wicked, the ruler over all, the heavenly, the friend of both worlds, Mazdā! . . . Father of the pure creatures at the beginning, who hath created the way of the sun, of the stars, who causeth the moon to wax and to wane. . . . He holdeth the earth and the unsupported [heavenly bodies?], the waters and the trees, and giveth swiftness to the wind and the clouds. . . . The creator of the good mind, the working good, hath made light as well as darkness, sleep and waking, the morning dawn, the noons, the nights," &c.—"Yazna," 43.) Sprung from Zarvan-Akarana (the bound-



less time), i. e., being from eternity, self-existing, neither born nor created, he unites within himself—as does man and everything else existing—the two primeval principles of good and evil, the Spento-mainyus—i. e., the white, holy spirit; and the Angromainyus (corrupted into Ahriman)—the dark spirit. This Zoroastrian conception of the two sides of the divine being—itsself one and indivisible—has, however, in the course of time, partly through misunderstandings and wilfully false interpretations, undergone important changes. While the Zervan-Akarana was transformed by the Magi—in opposition to the Zendiks—into the Supreme Being itself, the philosophical notion of a duality in O. became the theological dogma of god and devil, jealous of each other's power, bent upon the destruction of each other's works, and consequently in constant war with each other, they and their armies. Both are—according to this corrupted view of later times, by means of which the genuine one has been forgotten up to our day—supreme rulers; both have their fixed number (of councillors (sprung from an egg, *Plut. Isis and Osiris*), who are the actual governors of the whole universe, each in his special province; which councillors, however, are neither more nor less than certain abstract ideas of Zoroaster. One personal archangel alone is assumed by the latter, viz., Sroosha (Seroosh, cf. Sanct. Shruti), i. e., hearing, tradition. He is vested with very high powers, and stands between O. and man; he is the teacher of good religion; he shews the way to heaven, and pronounces judgment over human actions after death. He is the personification of the whole divine worship and its outward manifestations, the symbols, prayers, sacrifices, rites, &c., and the chief combatant of the influence of the Devas; who stand symbolically for the Brahmanic religion. O. is represented as sitting upon a throne of light, as a venerable man, or seated upon a bull, &c.—For further particulars about the seasons and the manner of his worship, as well as the general relations between his and the Brahmanic religion (both the result of a prehistoric conflict between the Iranians and those Arian brother-tribes who immigrated into Hindustan Proper), we must refer to PARSEES, PERSIA, and ZOROASTER.

ORNAMENTATION, or Decoration, in Architecture, applies to something which is added to the simple constructive features, or to the form given to those features, for the purpose of making them beautiful or elegant. Thus, the Doric shaft, while answering the constructive purposes of a simple square or round pier, is ornamented with fluting; and its capital, with its beautifully proportioned echinus and abacus, supports as a plain slab would do the weight of the entablature. The other classic orders illustrate this in a richer manner. Thus, the Corinthian column, with its fluted and elegant shaft, resting on an ornamented base, and crowned by an ornamented capital, takes the place of what might have been, had utility alone been consulted, a plain pier of rubble-work, with a rough stone to rest upon, and another on the top to receive the load.

In classic architecture, as in every good style, the same principle pervades all the ornamental features—viz., that they are constructive features ornamented in a manner suitable to their use; for instance, a column being a member for support, should be of such a form as to denote this—the constructive use of a cornice being to protect the top of the wall, and to shield the front of it from the rain and sun, it should be made of such a form as to do this, and also to look as if it did it—to express its purpose. In classic architecture, the cornice consists of several members, in which the constructive decoration is well seen; the mutules and modillions beautifully indicating in an ornamental manner their original use, while the leaf enrichments of the small moldings give life and animation to the building. In medieval art the same principle prevails in a much greater degree, and over a more complex system of construction. The shafts, with their elegant and purpose-like bases and caps, are arranged so that each supports a separate member of the vaulting. The arch moldings are divided so as to indicate the rings of their constructive formation. The buttresses, so elegant in outline, express the part they serve in supporting the vaulting; the pinnacles, with their ornamental finials, are the decorated dead-weights which steady the buttresses. The foliage and smaller ornament is also beautifully and suitably applied, as the growth and vigor of the supporting capitals and corbels, and the running foliage of the string-courses, arch-mouldings, &c., fully illustrate.

There are, no doubt, many styles of art to which these remarks can hardly be said to apply, as, for example, the Assyrian, Egyptian, and Hindu styles, where we find many features applied in a manner meant to be ornamental, although actually con-

trary to their constructive use. In these styles (and also in Greek architecture), human figures, bulls, and other animals are placed as columns to carry the weight of a superincumbent mass. This is evidently wrong in principle, except when the figure is placed in an attitude to indicate that he is supporting a weight, as the Greek Atlantes do; but in the former cases religious notions seem to have overcome true artistic feeling. There are also many forms of ornament used in all styles, the origin of which is obscure, and their advantage doubtful; such are the zigzag, chevron, billet, &c., so common in early mediæval art, and the scrolls of Ionic and Indian art, and the complications of the interlacing work of the North in the middle ages. Such things may be admissible in colored decoration, such as the confused patterns of Saracenic art, and the shell-patterns of Indian art; but where ornamental form is wanted, unless the requirements of the construction are carefully followed as the guide to the decoration, all principle is lost, and the ornament runs wild. This has frequently occurred in the history of art, and in no case more markedly than in the art of the Renaissance.

The material in use must also have an influence on the form and style of the ornament. Thus, stone-carving and metal-work must evidently require different treatment. Fac-simile leaves might be formed in iron, but could not be so carved in stone. This constructive element should be carefully attended to in designing. All imitative art must be to some extent conventional. Natural objects, such as leaves, flowers, &c., cannot be copied absolutely literally; and in suiting the conventional treatment to the nature of the material used, lies the great skill of the artist.

ORNE, a department of France formed out of the old provinces of Normandy and Perche, is separated on the north from the English Channel (La Manche) by the department of Calvados. Area, 1,506,737 acres, more than one-half of which is cultivable land; pop. (1872) 398,250. A range of wooded hills, nowhere rising above 1370 feet, extends across the south of the department from east to west. North of this range the surface slopes toward the English Channel; south of it, toward the Atlantic. The principal rivers are the Orne (which gives name to the department), the Rille, the Sarthe, and Huisne. The climate is damp, though in general temperate, and the winters are severe. The soil is fertile, but agriculture is not in an advanced state. The inhabitants consume one-third more grain produce than is grown on the land. There are several millions of apple and pear trees planted along the roads, &c., and cider is extensively made. Cattle, and horses of the purest Norman breed, are reared. Mining is an important branch of industry; the chief products are iron and copper; marble, granite, and other stones for building are quarried. The department is divided into four *arrondissements*, Alençon, Argentan, Domfront, and Mortagne; capital, Alençon.

ORNITHOLOGY (Gr. *ornis*, a bird, and *logos*, a discourse), that branch of zoology of which the subject is birds. By Aristotle, Pliny, and others of the ancients, this study was prosecuted to some extent, along with other parts of natural history; but it is only in modern times that ornithology has assumed the rank of a distinct branch of science. The first modern author to attempt a scientific classification of birds seems to have been Pierre Belon, noted also as an ichthyologist, whose "*Historia Avium*" was published about the middle of the 16th century. Some of his classes are very heterogeneous assemblages; but the first three, viz., Birds of Prey, Web-footed Birds, and *Grallæ*, are so natural as to have been acknowledged, with some modification of their limits, in all subsequent systems. In the 17th c. much progress was made in the observation and description of species, not only of the birds of Europe, but of other parts of the world. In the latter part of the century, attention began to be given to the anatomy of birds. An ornithological system, more perfect than that of Belon, was proposed by Willughby about 1676, and afterwards matured and improved by Ray. On this system that of Linné was founded. During the 18th c., the progress of ornithology was very rapid. The birds of many countries were described in works specially devoted to them, and the habits of birds began to be carefully observed; but the system of Linné, as framed by him before the middle of the century, continued to prevail almost unmodified till the publication of Cuvier's "*Règne Animal*" in 1817. Latham, Lacépède, Illiger, Temminck, and others, had indeed previously proposed systems more or less different from it; and systems have since been proposed by others, particularly by Mr Vigors and Mr Swainson, who have endeavored to accommodate the classification to certain first principles which they sup-

posed to pervade nature, but which other naturalists in general regard as fanciful. The system of Cuvier is now generally received by ornithologists, as that of Linné formerly was; not, however without modifications, by which it has been sought to accommodate it to the progress of science, and some of the names introduced by other authors have obtained very general acceptance. The system of Linné divided birds into six orders—*Accipitres*, *Piceæ*, *Anseres*, *Grallæ*, *Gallinæ*, and *Passeres*. That of Cuvier also divided them into six orders—*Birds of Prey* (the *Accipitres* of Linné, now often called *Raptores*), *Passerine Birds* (*Passerina*, now more generally called *Inscansores* or *Perching Birds*, including most of the Linnæan *Passeres*, and part of *Piceæ*), *Climbers* (*Scansores*, part of the Linnæan *Piceæ*, and often designated *Zygodactyli* or *Zygodactylous Birds*), *Gallinaceous Birds* (now often called *Ranores*, the Linnæan *Gallinæ*, but including also the pigeons or *Columbidæ*, which Linné placed among *Passeres*), *Stilt-birds*, often called *Waders* (*Grallatores*, the Linnæan *Grallæ*), and *Web-footed Birds* (*Palmipedes*, now also known as *Natatores* or *Sesimernæ*). These orders are noticed in separate articles. Perhaps the most important modification of Cuvier's system which has been proposed, is the separation of the *Brevipennes* or *Struthious Birds* from *Grallæ*, and their formation into a distinct order, sometimes called *Cursores* or *Runners*; and next to this may be mentioned the proposed separation of *Columbidæ* from Gallinaceous Birds.—The progress of ornithology since the commencement of the 19th c. has been very rapid; every department of it has been assiduously cultivated, and many of the works published have been not only of great merit, but very sumptuous and beautiful. The works of Audubon and Gould perhaps merit particular notice.

ORNITHORHYNCHUS. See DUKE-BILL.

OROBANCHÆÆ, or Orobanchacææ, a natural order of exogenous plants, all herbaceous and destitute of true leaves, but having their stems covered with brown or colorless scales. They all grow parasitically upon the roots of other plants. The calyx is divided, persistent, inferior; the corolla monopetalous, hypogynous, and irregular. The stamens are four, two long and two short; the ovary 1-celled, seated in a fleshy disc, composed of two carpels, with one style. The fruit is capsular, enclosed within the withered corolla, 1-celled, 2-valved. The seeds are numerous, and very minute. There are about 120 known species, natives chiefly of temperate climates, and generally characterised by astringency and bitterness, upon account of which some of them have been used in medicine (see CANCER ROOT). Eleven species are natives of Britain, chiefly belonging to the genus *Orobanche*, or BROOM-RAPE; to some of which important medicinal virtues were once erroneously ascribed. The enlarged base or rootstock of a species of *Orobanche* is cooked or dried, and eaten by the Indians of the north-western parts of America.

O'ROBES, a genus of plants of the natural order *Leguminosæ*, suborder *Papilionaceæ*, allied to Vetches, and sometimes called BITTER VETCH; the style linear, downy beneath the stigma; the calyx obtuse at the base and oblique at the mouth; its upper segments deeper and shorter; the pod 1-celled, 2-valved; the leaves pinnate, without tendrils. The species are perennial herbaceous plants, chiefly natives of Europe. They afford good food for cattle. Two are natives of Britain, of which the most common is *O. tuberosus*, whose racemes of purple flowers often adorn heaths and bushy places, especially in hilly districts. The stem is unbranched, erect, about a foot high, with narrow membranous wings; the leaflets in 2-4 pairs; the pods long, cylindrical, black; the root creeping and swelling out into tubers at irregular intervals. The tubers have a sweet taste, resembling that of liquorice, and are sought after by children; they are also bruised and steeped in water in some parts of the Highlands of Scotland to make a fermented liquor, and a kind of liquor is made by steeping them in whisky; they are well-flavored and nutritious when boiled or roasted, and are used in this way in the Highlands of Scotland, in Holland, Belgium, and other countries.

ORO'NTES, the ancient name of a river in Syria, now called *Nahr-el-Asi*. It rises in the highest part of Cœle-Syria, near Baalbek, flows northward between the mountains of Libanus and Anti-Libanus, as far as the city of Antioch, and then westward to the Mediterranean Sea, after a course of 240 miles, passing by a cross valley, through the mountains of the Syrian coast. Its lower course is remarkably beautiful, surpassing everything else that can be seen in Syria. Its rocky banks are 200

feet high, and the windings of the river shew them off to the greatest advantage. Myrtle-bushes, laurels, figs, wild vines, arbutus, dwarf-oaks, and sycamores (*Acer pseudo-platanus*) are scattered about in picturesque confusion. Here and there the eye catches a glimpse of some cavern mouth or ivy-matted precipice, while from the abyss beneath ascends for ever the roar of the impatient stream. The country through which it flows is of great fertility, and in many parts is richly cultivated.

ORO'SIUS, Paulus, a Spanish presbyter and historian, was born at Tarragona, and flourished in the early part of the 5th century. He went to Africa about 418 A.D., where he made the acquaintance of St Augustine, and thence to Palestine, to study under St Jerome, then living at Bethlehem. He finally settled in Africa, but the date of his death is unknown. His chief work, the "*Historiarum adversus Paganos Libri 7*," begins with the creation and goes down to 417 A.D. It is apologetic in design, being intended to refute the notion then current among the pagans, that the misfortunes of the Roman Empire and the wretchedness of the great masses were owing to the anger of the gods at the abandonment of their worship, and the profanation of their altars. The work is a trivial, inaccurate uncritical miscellany of facts, culled from such second-rate authorities as Justin and Eutropius; the style is elegant, but also, as Bacon says, "watery." Yet it has obtained a place in literature from being a favorite text-book of universal history during the middle ages, and had the honor of being translated into Anglo-Saxon by our own Alfred. Some manuscripts bear the puzzling title of "*Hormesta*" or "*Ormista*," conjectured by some to be a corruption of Or. M. ist.; that is, "*Orosii Mundi Historia*" (Orosius's History of the World). The editio princeps of the work appeared at Vienna in 1471; the best edition is that of Havercamp (Lug. Bat. 4to, 1758). Other writings of O.'s are "*Liber Apologeticus de Arbitrii Libertate*," an anti-Pelagian treatise, "*Communitorium ad Augustinum*," an explanation of the state of religious parties in Spain in his time. See Möner's "*De Orosii Vita ejusque Historiarum Libri Septem adversus Paganos*" (Berl. 1844).

OROTA'VA, a town on the north coast of Teneriffe, one of the Canary Islands, is situated below the Peak, in one of the most fertile, pleasant, and healthy districts in the world. It contains several beautiful churches, the residence of the governor and the citadel. Fishing is carried on to some extent, and there is a trade in wine. Pop. about 9000.

ORPHEUS (supposed to be the Vedic Ribhu or Arbhu, an epithet both of Indra and the Sun), a semi-mythical name of frequent occurrence in ancient Greek lore. The early legends call him a son of Apollo and the muse Calliope, or of Oeagrus and Clio, or Polymnia. His native country is Thracia, where many different localities were pointed out as his birthplace—such as the Mounts of Olympus, and Pangæus, the river Enipeus, the promontory of Serrhium, and several cities. Apollo bestows upon him the lyre, which Hermes invented, and by his aid O. moves men and beasts, the birds in the air, the fishes in the deep, the trees, and the rocks. He accompanies the Argonauts in their expedition, and the power of his music wards off all mishaps and disasters, rocking monsters to sleep and stopping cliffs in their downward rush. His wife, Eurydice (? = Sanscr. Uru, Dawn) is bitten by a serpent (? = Night), and dies. O. follows her into the infernal regions; and so powerful are his "golden tones," that even stern Pluto and Proserpina are moved to pity; while Tantalus forgets his thirst, Ixion's wheel ceases to revolve, and the Danaïdes stop in their wearisome task. He is allowed to take her back into the "light of heaven," but he must not look around while they ascend. Love or doubt, however, draw his eyes towards her, and she is lost to him for ever (? = first rays of the sun gleaming at the dawn make it disappear or melt into day). His death is sudden and violent. According to some accounts, it is the thunderbolt of Zeus that cuts him off, because he reveals the divine mysteries; according to others, it is Dionysius, who, angry at his refusing to worship him, causes the Menades to tear him to pieces, which pieces are collected and buried by the Muses in tearful pitey at Leibethra, at the foot of Olympus, where a nightingale sings over his grave. Others, again, make the Thracian women divide his limbs between them, either from excessive madness of unrequited love, or from anger at his drawing their husbands away from them. Thus far legend and art, in manifold hues and varieties and shapes, treat of O. the fabulous. The faint glimmer of historical truth hidden beneath these myths becomes clearer in

those records which speak of O. as a divine bard or priest in the service of *Zagreus*, the Thracian *Dionysius*, and founder of the *Mysteries* (q. v.); as the first musician, the first inaugurator of the rites of expiation and of the *Mantic art*, the inventor of letters and the heroic metre; of everything, in fact, that was supposed to have contributed to the civilisation and initiation into a more humane worship of the deity among the primitive inhabitants of Thracia and all Greece: a task to which O. was supposed to have devoted his life after his return with the *Argonauts*. A kind of monastic order sprang up in later times, calling itself after him, which combined with a sort of enthusiastic creed about the migration of souls and other mystic doctrines a semi-ascetic life. Abstinence from meat (not from wine), frequent purifications and other expiatory rites, incantations, the wearing of white garments and similar things—not unlike some of the *Essenic* manners and customs—were among their fundamental rules and ceremonies. But after a brief duration the brotherhood, having first, during the last days of the Roman empire, passed through the stage of conscious and very profitable jugglery, sank into oblivion, together with their "orphetistic" formulas and sacrifices, and together with the joys of the upper, and the never-ending punishments of the infernal regions which they held out to their rich dupes: according to the sums they grudged or bestowed upon them.

O. has also given the name to a special literature called the *Orphic*, the real origin of which, however, is (according to *Ottfried Müller*), like *Orpheus's* own history, "unquestionably the darkest point in the entire history of early Greek poetry." Like *Olen*, *Linus*, *Phaemon*, *Eumolpus*, *Museus*, and other legendary singers of prehistoric Greece, O. is supposed to have been "the pupil of *Apollo* and the *Muses*," and to have first composed certain hymns and songs used in the worship of a *Dionysius*, dwelling in the infernal regions, and in the initiations into the *Eleusinian mysteries*. A mere "abstraction," as it were, he was called the first poet of the heroic age, and though not mentioned before *Ibycus*, *Pindar*, *Hellanicus*, and the *Athenian tragedians*, he was yet placed anterior to both *Homer* and *Hesiod*. The fragments current under his name were first collected at the time of the *Pisistratidae*, chiefly by *Onomacritus*, and these fragments grew under the hands of the *Orphic* brotherhood, aided by the *Pythagoreans*, to a vast literature of sacred mythological songs sung at the public games, chanted by the priests at their service, worked out for dramatic and pantomimic purposes by the dramatists, commented upon, philosophised upon, and "improved" by grammarians, philosophers, and theologians. Although authorities like *Herodotus* and *Aristotle* had already combated the supposed antiquity of the so-called *Orphic* myths and songs of their day, yet the entire enormous *Orphic* literature which had grown out of them retained its "ancient" authority, not only with both the *Hellenists* and the church fathers of the 8d and 4th centuries A.D. (who, for their individual, albeit opposite purposes, referred to it as the most authentic primitive source of Greek religion, from which *Pythagoras*, *Heraclitus*, *Plato* had drawn their theological philosophy), but down almost to the last generation, when it was irretrievably proved to be in its main bulk, as far as it has survived, the production of those very third and fourth centuries A.D., raised upon a few scanty, primitive snatches. The most remarkable part of the *Orphic* literature is its *Theogony*, which is based mainly on that of *Hesiod*, with allegorising and symbolising tendencies, and with a desire to simplify the huge *Olympic* population by compressing several deities into a single one. See *THEOGONY*. Yet there is one figure which stands out here prominently—viz., *Zagreus*, the horned child of *Zeus* by his own daughter *Persephone*, who, killed by the *Titans* at the bidding of *Hera*, is reborn by *Semele* as *Dionysius*.

Besides the fragments of the *Theogony* which have survived, imbedded chiefly in the writings of the *Neoplatonists*, are to be mentioned the "*Argonautica*," a poem of the Byzantine period, consisting of 1384 hexameters; further, a collection of 87 or 88 liturgical hymns; a work on the virtues of stones, called "*Lythica*," &c. Other poems belonging to the *Orphic Cycle*, of which, however, only names have survived in most instances, are "*Sacred Legends*," ascribed to *Cercops*; a Poem on Nature, called "*Physica*," probably by *Broutinus*; "*Bacchica*," supposed to be written by *Avignota*, the daughter of *Pythagoras*; "*Minyas*," or *Orpheus's* descent into the *Hades*; and other poetical productions by *Zopyrus*, *Timocles*, *Nicias*, *Perseus*, *Prodicus*, &c. The best edition of the *Orphic* fragments is that of *G. Hermann* (Leipzig, 1805). The hymns have repeatedly been translated into English by

T. Taylor and others. The chief authority on the Orphic literature still remains Lobeck's "Aglaophamus."

**ORPIMENT.** See **ARSENIC**.

**ORRERY**, a machine constructed for the purpose of exhibiting the motions of the planets round the sun, and of the satellites round their primaries, which was in high repute during the 18th and beginning of the 19th centuries, though now regarded as a mere toy. It was a combination of the old *Planetarium* (q. v.), with other machines which shewed the motions of the earth, moon, and planetary satellites. Though the construction of a machine which would exhibit accurately the motions, distances, and magnitudes of the planets is impossible, yet an orrery is in some degree useful as giving a general notion of the way in which the planetary motions are performed. As it was a favorite machine at one time, a description of it may not be uninteresting. A number of iron tubes equal in number to the planets, and of different dimensions, are placed one within the other; their lengths being arranged so that the innermost tube projects at both ends beyond the one next to it, that one similarly projects beyond the third, and so on. At one end of each tube a rod is fixed at right angles, and a ball or lamp attached to its end; the lengths of the rods being proportional (or at least supposed to be so) to the radii of the planetary orbits. The other ends of the tubes form the axes of toothed wheels, which are connected either directly, or by means of combinations of toothed wheels, with a winch. The several combinations of wheels are so adjusted that the velocity of revolution of the rods is proportional to the times of revolution of the planets. On turning the winch the whole apparatus is set in motion, and the balls or lamps (representing the planets) revolve round the centre, which is a fixed lamp (representing the sun), at different distances, and with varying velocities. There are many nice arrangements, such as for producing elliptic motion, but these need not be described.

**ORRIS ROOT** (probably a corruption of *Iris Root*), the rootstock (*rhizome*) of certain species of *Iris* (q. v.), natives of the south of Europe, belonging to the division of the genus having bearded flowers, sword-shaped leaves, and scapes taller than the leaves; viz. *I. Florentina*, a species with white flowers; *I. pallida*, which has pale flowers; and *I. Germanica*, which has deep purple flowers. The flowers of all these species are fragrant. *I. Germanica* extends further north than the other species, and its root is sometimes said to be more acrid. O. R. was formerly used in many medicinal preparations as a stimulant, but is now almost entirely disused. It is sometimes chewed to sweeten an offensive breath. Its chief use is in perfumery. It has a pleasant smell of violets, which it acquires in drying. Hair and tooth powders, and oils, are often scented with it. A tincture of it is also used as a scent, and is often sold as *Essence of Violets*.

**ORSINI**, Felice, an Italian revolutionist, who is destined to be remembered for his atrocious attempt on the life of the French emperor, Napoleon III., was born at Meldola, in the States of the Church, in 1819. The son of a conspirator, O. at an early age was initiated into secret societies, and before he had reached his twentieth year, he was thrown into prison, and condemned to the galleys for life. The amnesty of Pius IX. (1846) restored him to liberty, but he was soon after again imprisoned for participation in political plots. When the revolution of 1848 broke out, O. was elected as a deputy to the Roman Constituent Assembly. He was invested with extraordinary powers, and sent to Ancona and Ascoli to suppress brigandage. He signalled himself by the violence with which he executed his commission. He also took part in the defence of Rome and Venice; agitated in Genoa and the Duchy of Modena; and in 1853 was shipped for England by the Sardinian government, where he formed close relations with Mazzini. Furnished with money by the leaders of the revolutionary party, he appeared at Parma in 1854, and afterwards at Milan, Trieste, Vienna, everywhere agitating in the interest of insurrection; until at last he was arrested and confined in the fortress of Mantua. In 1856 he succeeded in making his escape, and found refuge in England, where he supported himself by public lecturing, and wrote a book entitled "The Austrian Dungeons in Italy" (Lond. 1856). Towards the end of 1857 he repaired to Paris, with the intention of assassinating Louis Napoleon, whom he reckoned the great obstacle to the progress of revolution in Italy. His

Orsova  
Ortona

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associates in this diabolical design were persons named Pieri, Rubio, and Gomez. Providing themselves with bombs, they took up their station in a house close by the opera, and on the evening of the 14th January 1853, just as the carriage containing the emperor and empress were drawing up, they threw three of the deadly missiles under the carriage. An explosion took place, and several people were wounded, one or two mortally, but their majesties remained unhurt. The assassins were arrested, tried, and sentenced; Orsini, Pieri, and Rubio to capital punishment, Gomez to hard labor for life. Rubio's life was spared at the intercession of the empress, but Pieri and Orsini were beheaded on March 13.

ORSOVA, the name of two towns at the iron gate of the Danube (q. v.). Old O., a Hungarian place, is on an island, and is a station for the Danube steamers. Pop. 1900.—New O., on the Servian side, is a fortified town of 3000 inhabitants.

ORTHEZ, a small town of France in the department of Basses-Pyrénées, on the right bank of the Gave de Pau, 37 miles east of Bayonne. Pop. (1872) 4737. The castle of Moncada, now reduced to a few ruined walls, overtopped by one stately tower, was built here in 1240 by Gaston de Foix. In the immediate vicinity of the town, the British, under Wellington, gained a grand and decisive victory over the French under Soult, February 27, 1814.

ORTHIS (Gr. *straight*), a large genus of fossil brachiopodous mollusca, found in the Palæozoic rocks, most abundantly in the Silurian rocks, but ranging upwards to the Permian series. The genus contains upwards of 100 species.

ORTHO'CERAS (Gr. *straight horn*), an extensive genus of cephalopodous mollusca, found in the palæozoic rocks, from the Lower Silurian to the Trias. It is nearly allied to the Nautilus, and is indeed, in its simplest forms, nothing more than an unrolled and straightened nautilus. The shell is straight, the siphuncle central, and the body chamber small. The members of the genus are the most widely distributed, and the most abundant of any of the palæozoic fossils. Nearly 900 species have been described, but a considerable number of these have been separated into sub-genera, characterised chiefly by the form and size of the siphuncle.

ORTHODOXY (Gr. *orthos*, right, and *doxa*, an opinion), a name given by theologians to religious opinions in agreement with Scripture, or rather with the view of Scripture entertained either by the church in general, or by the Established Church of any particular nation. Its antithesis is HETERODOXY (Gr. *heteros*, another, meaning "wrong," and *doxa*, opinion).

ORTHOEPEY (Gr. *correctness or propriety of speech*), a branch of grammar that treats of the right pronunciation of the words of a language.

ORTHO'GRAPHY (Gr. *correct writing*), a branch of grammar that treats of the elementary sounds of a language, the signs or letters by which they are represented in writing, and the combinations of these signs to represent words; it also includes the right dividing of words into syllables (as when a word has to be divided at the end of a line), and punctuation. In a more restricted sense, orthography is synonymous with the art of correct spelling. No part of grammar is less satisfactory than this. All alphabets were from the first both defective and redundant, and therefore inadequate to represent exactly the elementary sounds of the languages to which they were applied (see ALPHABET, LETTERS and ARTICULATE SOUNDS). The first attempts then at writing any language must have exhibited great diversity of spelling. Wherever an extensive literature has sprung up among a people, and language been made a study of itself, there a greater or less uniformity of spelling has, by tacit convention or otherwise, become established for a time. Such was the case with Latin in the time of the Cæsars, with High German about the 12th and 13th centuries, and with English (Anglo-Saxon) in and for some time after the days of Alfred. But although language, as depicted to the eye, may be fixed for a time, the spoken tongue, being a living organism, cannot be thus petrified. A written literature may modify, and in some degree retard, but cannot altogether arrest that incessant change and evolution to which all spoken tongues are subject. The breaking up of the Anglo-Saxon in its transition into modern English, brought necessarily a period of orthographic chaos. Never was the lawlessness greater than during one of the brightest periods of the literature, namely, the Elizabethan period. Then, and for a long time after, all perception of the real powers

of the letters seems to have been lost, and nothing but caprice ruled. Not only were words spelled differently by different persons, but even among the best educated classes, the same person would spell the same word (even his or her own name) half-a-dozen ways in the same page. Among the classic writers of the Queen-Anne period, some degree of uniformity began to establish itself, and this was afterwards further confirmed and fixed by the publication of Johnson's Dictionary, since which time the alterations have been comparatively trifling. The modern spelling thus established, conformed itself only partially to the changes the spoken language had undergone. Of the letters that had become silent through the wearing away and collapse of the spoken words, some were omitted and others retained, with little attention to consistency, or to any principle now discernible. Hence, in the English language as now written and spoken, there is in general so imperfect a correspondence between the sound of a word, and the sounds of the several letters that are written to represent it, that the spelling of each individual word has, in a manner, to be learned by itself. By no possible rules can a learner be taught when he sees the groups of letters *n-o-w*, *p-l-o-u-g-h*, *e-n-o-u-g-h*, to make out the sounds or spoken words that these groups actually represent; or, conversely, when he hears the words spoken, to find out what letters they are to be represented by. This circumstance presents great difficulty to foreigners in the acquisition of English; which, in other respects, is one of the simplest and most easily learned languages in the world. The orthography of English is only to be acquired by observation and practice. There are no rules in the proper sense of the word; the only effective assistance that can be given in this matter is to bring together, under some kind of classification, the words that are most frequently misspelled. See PHONETIC WRITING.

**ORTHOPTERA** (Gr. straight-winged), an order of mandibulate insects, in many respects resembling the *Coleoptera* (q. v.), but having the wing-covers softer and generally leathery and flexible. The wing-covers also often overlap on the back when at rest, or meet at an angle like the roof of a house. The wings are broader than the wing-covers, and fold in a fan-like manner. A few species are wingless. The body is generally elongated. The antennæ are almost always filiform and many-jointed. The eyes are usually very large, and there are also in most species two or three stemmatic eyes. The mouth much resembles that of the *Coleoptera*, but the maxillæ are terminated by a horny denticulated piece, and covered by a *galea*; and the interior of the mouth exhibits a distinct fleshy piece, which some regard as a kind of tongue. The *O.* undergo only a semi-complete metamorphosis, the larva and pupa much resembling the perfect insect, except in the want of wings; which, however, begin to be developed in the pupa. The Earwig family differs so much from the other *O.* as to have been constituted by some entomologists into a distinct order. See **EARWIG**. The *O.* are divided into two sections, *Cursoria* and *Saltatoria*; the first with legs adapted for running, as the Mantle family, Spectre Insects, Walking Sticks, Leaf Insects, &c.; the second having the hinder legs very large and strong, generally adapted for leaping, as Grasshoppers, Locusts, Crickets, &c.

**ORTOLAN** (*Emberiza hortulana*), a species of Bunting (q. v.), much resembling the Yellow Hammer, and not quite equal to it in size. The adult male has the back reddish brown, the wings dusky black and rufous brown; the tail dusky black, some of the outer tail-feathers with a patch of white on the broad inner web; the chin, throat, and upper part of the breast yellowish-green; the other under parts reddish buff-color. The plumage of the female is of less vivid hues. The *O.* occurs in great flocks in the south of Europe and north of Africa. Even in the south of Europe it is a summer bird of passage, but its migrations extend as far north as Lapland, although in Britain it is a very rare bird, and only of accidental occurrence. It has no song, but merely a monotonous chirping note. It frequents bushy places, but often makes its nest on the ground in cornfields, particularly where the soil is sandy. No bird is so highly esteemed by epicures, and vast numbers are used for the table. It is taken chiefly by nets, with the aid of decoy-birds, and after being taken is fattened on millet and oats, in rooms dimly lighted by lamps. Thus treated, it becomes excessively fat, sometimes so as to die of obesity; and attains a weight of three ounces. Great numbers of ortolans, potted and pickled, are exported from Cyprus.

**ORTONA**, a town of S. Italy, on the Adriatic, in the province of Chieti, 14 miles e. of the town of that name, and 8 miles n. of Lanciano. It gives title to a bishop,



Ortyx  
Oseola

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and contains a cathedral and other religious edifices. Its port has ceased to exist, and vessels are now obliged to anchor about a mile from the town in unsheltered roads, where, however, the water is deep and the bottom good. Wine is extensively grown, and has a local reputation as the best in this part of Italy. Pop. about 7000.

O'RTYX. See VIRGINIAN QUAIL.

ORU'RO, or, in the complete form of the name, *San Felipe de Asturias de Oruro*, a town of Bolivia, the capital of the dep. of Oruro. It is situated about nine miles east from Desaguadero, and 32 miles north from the northern extremity of the salt lake of Desaguadero, on an affluent of the river of the same name which falls into that lake. It is 12,015 feet above the level of the sea, at the base of a very high mountain; but on the other side of the town is a large plain, often covered with saline efflorescences. The soil of the whole department is saline, and far from being fertile, but its mineral wealth is great. Gold, silver, copper, tin, iron, lead, and antimony are among its products. O. was founded in 1590, in consequence of the discovery of silver mines, which proved more productive than any in Bolivia, except those of Potosi. It soon became a wealthy and flourishing city with 70,000 inhabitants; but in consequence of the diminished productiveness of its mines, and of the anarchy prevailing in the country after the Revolution, its population declined, and is now only 7930. It has recently been made the seat of the Bolivian government, and the place of meeting of congress.

ORVIE'TO, a city in the province of Umbria (Perugia), which was included in the former Papal States, but now forms part of the kingdom of Italy, stands on the right bank of the Paglia, 8 miles north-east of Lake Bolsena, and 60 miles north-north-west of Rome. It occupies a strong position on a steep hill, is well built, and is surrounded with walls. It has been the seat of a bishop since 609 A.D. The cathedral, a beautiful specimen of the Italian Gothic, and one of the most richly-decorated edifices in Italy, is built of black and white marble, was begun in 1250, and completed about the middle of the 14th century. The facade is unsurpassed in richness of material, and in the beauty of its mosaics, sculptures, and elaborate ornamentation. The interior is also magnificently decorated with sculptures and paintings. The other chief buildings are St Patrick's Well, and several palaces. Pop. 7500, who trade in corn, cattle, and silk, and a delicate white wine, which is highly esteemed at Rome.

O., called in the time of the Longobards *Urbs Vetus*—of which its present name is a corruption—has been the place of residence and retreat in turbulent times of upwards of 30 popes. The city is evidently of Etruscan origin, but of its early history nothing is known.

O'RYX, the name given by the ancients to a species of antelope, a native of the north of Africa. It is often represented on the monuments of Egypt, and as these representations are almost always in profile, it is generally made to appear as having only one horn, thus probably contributing to the fable of the unicorn; and, indeed, all the older figures of the unicorn exhibit a considerable resemblance to this kind of antelope. The name *Antelope oryx* was given by Pallas to the Gems-hoc (q. v.), an antelope certainly much resembling the O., but found only in South Africa; and it is now generally believed that the true O. of the ancients is a species also known as the ALGAZEL (*Antelope Gazella*, or *Oryx bezoartica*), common in the north of Africa.

ORY'ZA. See RICE.

OSA'CA, or Ozaka, a city in Japan, in n. Lat. 35° 5', about 30 miles from its seaport of Hiogo, is situated on a large river on the south-east coast of the main island, in the most central and populous part of the empire, and surrounded by the great tea districts. O. is one of the three imperial cities of Japan, and is a great centre of trade; especially since 1863, when it became possible for foreigners to settle. The town, clean and regularly built, is intersected by numerous streams, spanned by hundreds of wooden and iron bridges. Some of the public buildings are imposing structures, such as the municipal hall and the new mint. The latter is equipped with the finest obtainable apparatus; and of late much foreign machinery has been introduced into O., to the great advancement of its manufactures. Besides very numerous Buddhist and other temples, there are in O. two Christian churches, a government college, an academy, and 73 public schools. The town is connected by

railway with Higo and with Klotu (see MIAXO), 27 miles further inland. Pop. (1872) 873,000. In 1873, the foreign imports were valued at £84,760; the exports at £134,756.

**OSAGE ORANGE** (*Maclura aurantiaca*), a tree of the natural order *Moraceæ*, a native of North America. It attains a height varying, according to soil and situation, from twenty to sixty feet. It is of the same genus with *Fustic* (q. v.), and its wood, which is bright yellow, might probably be used for dyeing. The wood is flue-grained and very elastic, and is much used by the North American Indians for making bows. The O. O. has been successfully introduced into Britain as a hedge plant. Its fruit is about the size of a large orange, has a tuberculated surface of a golden color, and is filled internally with radiating somewhat woody fibres, and with a yellow milky juice, the odor of which is generally disliked, so that the fruit, although not unwholesome, is seldom eaten.

**O'SBORNE** or **St Helen's Beds** are a series of strata of the Middle Eocene period, occurring in the Isle of Wight. They have been divided into two groups: 1. The **St Helen's Sands**, consisting of layers of white, green, and yellow sands, interstratified with blue, white, and yellowish clays and marls, with a maximum thickness of 60 feet; and, 2, the **Nettlestone Grits**, composed of yellow limestone and marl, and a shelly freestone, which is much used for building, having a maximum thickness of 20 feet. The fossils of the Osborne Beds are species of *Paludina* and *Cypria*, and the spirally sculptured spore-cases of *Chara*. The group is of fresh and brackish water origin, and is very variable in mineral character and thickness.

**OSCAR I.**, Joseph-Francis, king of Sweden and Norway, was born at Paris July 4, 1799, and was the only issue of the marriage of Charles XIV. (q. v.), formerly Marshal Bernadotte, with Desirée Clary, the daughter of a Marseillais merchant, and sister of Madame Joseph Bonaparte. After the election of his father as crown-prince of Sweden, O. received the title of Duke of Sudermania, and was placed under the tutelage of the poet Atterbom, for the purpose of acquiring the Swedish language. In 1818 he entered the university of Upsala, where his education was completed. The effects of the thorough training he received were seen in his remarkable proficiency in science, literature, and especially the fine arts. For some time he gave himself up almost entirely to the study of music, and composed various pieces, including an opera, and several waltzes, marches &c.; he is also the author of several songs and hymns, some of which are still popular. He also published memoirs on Education and Penal Establishments. What is of more consequence, he became thoroughly imbued with the national sentiments, and after his admission to a share in the administration, opposed, though with becoming filial respect, the pro-Russian policy of his father. This course of conduct rendered him immensely popular, and on March 8, 1844, his accession to the throne was hailed with rapture by the great majority of his subjects. His rule was distinguished for its liberality and justice; and many liberal measures, such as those for the removal of Jewish disabilities, freedom of manufactures and commerce, and parliamentary reform (the last-mentioned being vigorously opposed by the nobility), were laid before the *Riksdag* by his orders. He introduced these changes with caution and gentleness, and had the gratification of seeing, in most cases, his prudence crowned with success. His foreign policy was of an independent and anti-Russian character, and during the Crimean war he joined (November 21, 1855) the king of Denmark in a declaration of armed neutrality, which gradually assumed a more hostile attitude to Russia, and would have inevitably led to war, had not the Paris treaty so rapidly succeeded. His attitude at this time gained him general favor and respect throughout Europe. On July 19, 1823, he married Josephine Beauharnais, the granddaughter of the Empress Josephine, by whom he had five children, the eldest of whom, on account of his father's failing health, was appointed regent, September 25, 1857, and succeeded to the throne as Charles XV., on the death of O., July 8, 1859. Charles XV. died 18th September 1872, and was succeeded by his brother as Oscar II.

**OSCEOLA** (Seminole, *A-sa-ho-lar*), a chief of the tribe of Seminole Indians in Florida, U. S., was born about 1808. He was the son of an English trader, named Powell, and the daughter of a Seminole chief. In 1835 the wife of O., a chief's daughter, was claimed and seized as a slave by the owner of her mother. The outraged husband threatened revenge, and for his threats was imprisoned six days in

Oschersleben  
Osien

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irony by General Thompson. Lying in wait, a few days afterwards he killed the general and four others. This was the beginning the second Seminole war. Laying an ambush soon after, he killed Major Dale and a small detachment of soldiers, and taking to the almost impenetrable Everglades, with two or three hundred followers, he fought for a year with great energy and skill the superior numbers sent against him. He was taken prisoner at last by General Jessup, while holding a conference under a flag of truce, an act of inexcusable treachery, though represented as one of retaliation, and confined in Fort Moultrie until his death in January 1833.

O'SCHERSLEBEN, or Gross-Oschersleben, a town of Prussian Saxony, on the left bank of the Bode, a branch of the Saale, 23 miles west-south-west from Magdeburg. Pop. (1875) 7927.

O'SCI, originally Opsci (rendered by Mommsen, "laborers," from *opus*, a work), in Greek always Opikoi, the name of an Italian people, who at an early period occupied Campania, and were either closely allied to, or the same race as the Ausones. Subsequently (about 423 B.C.) Samnites from the hilly districts to the north overran the country, and amalgamated with the inhabitants whom they had subjugated. It is conjectured that the conquerors were few in numbers, as (like the Normans in English history) they adopted in time the language of the conquered, but whether they modified the original Oscan language, and if so, to what extent, cannot now be ascertained. As it was these Samnitic Oscans or Campanians who formed that Samnitic people with whom both the Greeks of Lower Italy and the Romans first came into contact, the names *Osci* and *Oscan language* were subsequently applied to all the other races and dialects whose origin was nearly or wholly the same. The Oscan language was not substantially different from the Latin, but only a ruder and more primitive form of the same central Italic tongue. The territory where it was spoken comprised the countries of the Samnites, Frentani, Northern Apulians, Hirpini, Campani, Lucani, Brutii, and Mamertini, whose dialects only slightly differed from each other; besides the entire Samnitic races, whence the language is sometimes called Samnitic or Sannic. The races situated north of the Silarus were purely Samnitic; those south of it, and even of the region round the Gulf of Naples, were Græco-Samnitic. The use of the national Samnitic alphabet was confined to the former. By the victories of the Romans over the Samnites, and the conferring of the *civitas* on all the Italians (89 B.C.), an end was put to the official use of the Oscan tongue; nevertheless, in the time of Varro (1st c. B.C.) it was still used by the people, and as late as the destruction of Herculaneum and Pompeii was spoken by a few individuals. During its most flourishing period it was something more than a country *patois*; it is even possible that the Oscans had a literature and art of their own, which may not have been without influence on the early Calabrian poets, Ennius and Pacuvius, and the Campanian Lucilius. At any rate, we certainly know of a poetic creation peculiar to the Campanians, a kind of unwritten, regular, probably improvised farce, with fixed parts and changing situations, which were transplanted to Rome about 304 B.C., but was imitated there not in Oscan but in Latin. See ATELLANA. Besides a considerable number of coins with Oscan legends, there are still extant a number of inscriptions in the Oscan tongue, among which the most important for linguistic purposes are, 1st, the *Tabula Bantina*, a bronze tablet found in the neighborhood of Bantia (on the borders of Lucania and Apulia), referring to the municipal affairs of that town; 2d, the *Cippus Abellanus*, or Stone of Abella (in Campania); and 3d, a bronze tablet found near Agnone, in Northern Samnium. See Mommsen's "Oskische Studien" (Berlin, 1845), and "Die Unteritalischen Dialekte" (Leip. 1850); also Friedländer's "Die Oskischen Münzen" (Leip. 1850), Kirchhoff's "Das Stadtrecht von Bantia" (Berl. 1853), and Donaldson's "Varroianus" (pp. 104-138).

OSCULATION, AND O'SCULATING CIRCLE (Lat. *osculari*, to kiss). One curve is said to osculate another when several points are common to it with the other, and the degree of osculation is said to be high or low according as the number of points in contact are many or few. The number of possible points of contact is determined by the number of constants contained in the equation to the tangent curve (supposing the number of constants in the equation to the curve which is touched to be greater). The same is true of a straight line and a curve. The equation to a straight line being of the form  $ax+b$ , contains two constants,  $a$  and  $b$ , hence a

straight line can coincide with a curve in two contiguous points, and the contact is said to be of the first order. This straight line is the tangent at the point of contact. When a straight line, not a tangent, meets a curve, there is no "contact" but "section," as in that case only one point is common to the straight line and the curve. The equation to a circle contains three constants, and therefore a circle can have three consecutive points in common with a curve, and the contact is then of the second order. This circle is known as the "circle of curvature," or the osculating circle (see article CURVATURE), and has for its radius the radius of curvature of that portion of the curve with which the circle is in contact. No other circle can have so high a degree of contact with a curve at any point as the osculating circle at that point.

O'SHKOSH, a town in Wisconsin, U. S., on both sides of the Fox River, at its entrance to Lake Winnebago, 90 miles north-north-east of Madison. It has a large lumber trade, saw-mills, planing-mills, steam-boats, &c. Pop. (1890) 15,748.

OSIANDER, Andreas, one of the most learned and zealous of the German reformers, was born in 1498, at Gunzenhausen, near Nürnberg. His father was a blacksmith, called Hosemann, out of which name his son, after the fashion of his time, manufactured the classic-looking Oslander. O. was educated at Ingolstadt and Wittenberg, and after completing his course of study, became a preacher at Nürnberg, where he was conspicuously active in introducing the Reformation (1522). He ardently advocated the views of Luther in his controversy with the Swiss reformer Zwingli, on the question of the Lord's Supper. He took part in the conference held at Marburg (1529), and was present at the diet of Augsburg (1530). In 1548 he was deprived of his office as preacher at Nürnberg, because he would not agree to the Augsburg Interim; but was immediately afterwards invited by Albrecht, Duke of Prussia, to become the head of the theological faculty in the newly-established university of Königsberg. He was hardly settled here when he became entangled in a theological strife that embittered his naturally imperious and arrogant temper. In a treatise, "De Lege et Evangelio" ("On the Law and the Gospel"), O. asserted that the righteousness by which sinners are justified, is not to be conceived as a mere justificatory or imputative act on the part of God, but as something inward and subjective, as the impartation of a real righteousness, springing in a mystical way from the union of Christ with man. The most notable of his opponents was Martin Chemnitz (q. v.). A seemingly amicable arrangement between the disputants was brought about by Duke Albrecht in 1551; but the strife was soon recommenced, by O. publishing some new writings in which he attacked Melancthon; nor did his death in the following year put a stop to the war of words. It was continued by his followers, called *Osiandrists*, who were finally extinguished by the "Corpus Doctrinæ Prutenicum" (in 1567), which caused their banishment from all parts of Prussia. See Wilken, "Andr. Osiauder's Leben, Lehre und Schriften" (Strals. 1844).

O'SIER (Fr. probably of Celtic origin), the popular name of those species of Willow (q. v.), which are chiefly used for basket-making and other wicker-work. They are of low bushy growth, few of them ever becoming trees, their branches long and slender; and they are the more valuable in proportion to the length, slenderness, suppleness, and toughness of their branches. Their leaves are long and narrow, lanceolate, or nearly so, obscurely notched on the margin, almost always smooth on the upper side, but generally white and downy beneath. The COMMON O. (*Salix viminalis*), a common native of wet alluvial grounds in Britain and many parts of Europe, is one of those which sometimes become trees, although when cultivated for basket-making, it is not permitted to do so. It has two distinct stamens in the flowers of the male catkins; and the stigmas of the female catkins are long and slender. It is often planted to prevent the banks of rivers from being washed away. Its branches are used for making hoops and coarse baskets. There are several varieties in cultivation, not easily distinguished except by a very practised eye, but much more useful than the original or wild kind, which is apt to break, and therefore of little value. More suitable for the finer kinds of basket-making are *Salix Poryana*, sometimes called the FINE BASKET O., and *S. rubra*, known near London as the GREEN-LEAVED O. or ORNARD; *S. triandra*, a triandrous species, known to English osier-cultivators and basket-makers as the SPANARD ROD; whilst *S. vitellina*, a

pentandrous species, sometimes becoming a tree, is the GOLDEN O. or Golden Willow, remarkable for the bright-yellow color of its branches, as well as for their pliancy and toughness. There are other species, not natives of Britain, which are also valuable; but the osiers chiefly cultivated belong to those which have been named, or are very nearly allied to them.

Osiers are very extensively cultivated in Holland, Belgium, and France, on alluvial soils, especially near the mouths of rivers; and from these countries great quantities of "rods" are imported into Britain. They are cultivated also to a considerable extent in some parts of England, particularly on the banks of the Thames and the Severn, and in the level districts of Cambridgeshire, Huntingdonshire, &c. They are nowhere extensively cultivated in Scotland. Islets in the Thames and other rivers, entirely planted with osiers, are called *O. holts*. Osiers grow particularly well on grounds flooded by the tide. Much depends on the closeness of planting of *O.* grounds; as when space is too abundant, the shoots of many of the kinds do not grow up so long, slender, and unbranched as is desirable. The French cultivators, when they wish osiers for the finest kinds of basket-work, cut branches into little bits with a bud or eye in each, and plant these pretty close together, so as to obtain weak but fine shoots; but generally cuttings of fifteen or sixteen inches in length are used, and of tolerably thick branches; and these are placed in rows, from 18 inches to 2 feet apart, and at distances of 15 to 18 inches in the row. *O.* plantations in light soils continue productive for 15 or 20 years, and much longer in rich alluvial soils. Osiers succeed best in rich soils, but not in clays. No cultivation is required after planting; but the shoots are cut once a year, at any time between the fall of the leaf and the rising of the sap in spring. After cutting, they are sorted; and those intended for brown baskets are carefully dried and stacked, care being taken that they do not *heat*, to which they are liable, like hay, and by which they would be rotted and rendered worthless. The stacks must be carefully protected from rain. The osiers intended for white baskets cannot at once be peeled; but after being sorted, they are placed upright in wide shallow trenches, in which there is water to the depth of about four inches, or in rivulets, being kept secure in their upright position by posts and rails; and thus they remain till they begin to bud and blossom in spring, which they do as if they remained on the parent plant, sending forth small roots at the same time into the water. They are then, in ordinary seasons, easily peeled by drawing them through an instrument called a *break*, but in cold springs it is sometimes necessary to lay them for a while under a quantity of litter. After being peeled, they are stacked, preparatory to sale.

It is impossible to form an estimate of the quantity produced in Great Britain, but our imports amount annually to about 200,000 bundles: nearly one-half are from Holland, and the remainder from the Hanse Towns, Belgium, and France.

OSIRIS, according to others, *Asiris*, or *Hysiris* ("Many-eyed"), a celebrated Egyptian deity, whose worship was universal throughout Egypt. This name appears in the hieroglyphic texts as early as the 4th dynasty, and is expressed by a throne and eye; at a later period, that of the 19th, a palanquin is substituted for a throne; and under the Romans, the pupil of the eye for the eye itself. *O.* does not indeed appear to have been universally honored till the time of the 11th and 12th dynasties, or about 1800 B.C., when Abydos, which was reputed to be his burial-place, rose into importance. In the monuments of this age he is called great god, eternal ruler, dwelling in the west, and lord of Abut or Abydos. Even at the most remote period, individuals after death were supposed to become an Osiris; and all the prayers and ceremonies performed or addressed to them were in this character, referring to their future life and resurrection. At the time of the 18th dynasty, the title of Osiris was prefixed to their names, and continued to be so till the time of the Romans and fall of paganism.

In the ritual and other inscriptions, *O.* is said to be the son of Seb or Saturn, and born of Nu or Rhea; to be the father of Horus by Isis, of Anubis, and of the four genii of the dead. Many mystic notions were connected with *O.*; he was sometimes thought to be the son of Ra, the Sun, or of Atum, the setting Sun, and the Bennu or Phoenix; also to be uncreate, or self-engendered, and he is identified in some instances with the Sun or the Creator, and the Pluto or Judge of Hades. *O.* was born on the first of the Epgomense, or five additional days of the year. When born, Chronos or Saturn is said to have given him in charge to Panykes; having be-

come king of Egypt, he is stated to have civilised the Egyptians, and especially to have taught them agriculture, the culture of the vine, and the art of making beer; he afterwards travelled over the earth, and conquered the people everywhere by his persuasion. During his absence, his kingdom was confided to Isis, who guarded it strictly, and Set or Typhon, the brother of O. (who was born on the 8d of the Epagomene), was unable to revolt against him. Typhon had, however, persuaded 79 other persons, and Aso, the queen of Ethiopia, to join him in a conspiracy; and having taken the measure of O., he had a chest made of the same dimensions, richly ornamented and carved, and produced it at a banquet, where he promised to give it to whosoever it should fit; and when all had lain down and tried it, and it suited none, O. at last laid himself down in it, and was immediately covered over by the conspirators, who placed the lid upon it, and fastened it with nails and molten lead. The chest was then hurled into the Nile, and floated down the Tanaitic mouth into the sea. This happened on the 17th of the month Athyr, in the 28th year of the reign or age of Osiris. Khem or Pan, and his attendant deities, discovered the loss of the god; Isis immediately cut off a lock of hair and went into mourning, and proceeded in search of Anubis, the child of her sister Nephthys by O.; and having found him, brought him up. The chest having floated to Byblos, had lodged in a tamarisk, and became enclosed in the tree, which was cut down by the king, and the trunk, containing the chest and the body of the god, converted into a pillar to support the roof of the palace. The goddess proceeded to Byblos, and ingratiated herself with the queen's women by plaiting their hair and imparting to it an ambrosial smell, so that the monarch, whose name was Melcarthus, and his wife, Sais or Nemanoun, invited her to court to take care of the royal child. She endeavored to confer immortality upon him by placing him on a fire, and changing herself into a swallow, flew round the pillar and bewitched her fate. The queen became alarmed at the danger of her child; Isis revealed herself, and asked for the pillar of tamarisk wood, which was given her. She then cut it open, and took out the chest, making great lamentations, and subsequently sailed for Egypt, with the eldest of the king's sons. The goddess, intending to visit Horus her son at Buto, deposited the chest in an unfrequented spot; but Typhon discovered it by the light of the moon, tore it into 14 pieces, and distributed each to a nome or district. Isis recovered all by passing the marshes in a boat of papyrus; all except the phallus, which had been eaten by the Lepidotus, the Phagrus, and Oxyrhynchus fish. Subsequently, a battle took place between Horus and Typhon or Set, which lasted three days, and ended by Typhon having fetters placed upon him. Isis, however, liberated Typhon, which so enraged Horus that he tore off her diadem, but Teti or Thoth placed on her the head of a cow instead. Typhon finally accused Horus of illegitimacy; but the question was decided between them by Teti or Thoth and the gods. From O., after his death, and Isis sprung Harpocrates. See HARPOCRATES. O. seems to have been finally revived, and to have become the judge of the Karneter or Hades, presiding at the final judgment of souls in the Hall of the two Truths, with the 42 demons who presided over the capital sins, and awarding to the soul its final destiny. Thoth or Hermes recorded the judgment, and justified the deceased against his accusers, as he had formerly done for Osiris.

Considerable diversity of opinion existed amongst the ancients themselves as to the meaning of the myth of Osiris. He represented, according to Plutarch, the inundation of the Nile; Isis, the irrigated land; Horus, the vapors; Buto, the marshes; Nephthys, the edge of the desert; Anubis, the barren soil; Typhon, was the sea; the conspirators, the drought; the chest, the river's banks. The Tanaitic branch was the one which overflowed unprofitably; the 28 years, the number of cubits which the Nile rose at Elephantine; Harpocrates, the first shootings of the corn. Such are the naturalistic interpretations of Plutarch; but there appears in it the dualistic principle of good and evil, represented by O. and Set or Typhon, or again paralleled by the contest of Ra or the Sun, and Apophis or Darkness. The difficulty of interpretation increased from the form of O. having become blended or identified with that of other deities, especially Ptah-Socharis, the pigmy of Memphis, and the bull Hapis or Apis, the avatar of Ptah. Osiris was the head of a tetrad of deities, whose local worship was at Abydos, but who were the last repetition of the gods of the other nomes of Egypt, and who had assumed an heroic or mortal type. In form, O. is always represented

Osmazome  
Osmabrick

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swathed or mummied in allusion to his embalmment; a net-work, suggestive of the net by which his remains were fished out of the Nile, covers this dress; on his head he wears the cap *aty*, having at each side the feather of truth, of which he was the lord. This is placed on the horns of a goat. His hands hold the crook and whip, to indicate his governing and directing power; and his feet are based on the cubit of truth; a panther's skin on a pole is often placed before him, and festoons of grapes hang over his shrine, connecting him with Dionysos. As "the good being," or Onuophris the meek hearted, the celestial or king of heaven, he wears the white or upper crown. Another and rarer type of him represents him as the *Tut*, or emblem of stability, wearing the crown of the two Truths upon his head. His worship, at a later time, was extended over Asia Minor, Greece, and Rome, and at an early age had penetrated into Phœnicia, traces of it being found on the coins of Malta and other places. He became introduced along with the Isiac worship into Rome, and had votaries under the Roman empire. But the attacks of the philosophers, and the rise of Christianity, overthrow these exotic deities, who were never popular with the more cultivated portion of the Roman world.

Herodotus, ii. 40—42; Plutarch, "De Iside," Tibullus, l. 7; Diodorus, l. 2; Richard, "Mythology," p. 208; Wilkinson, "Man. and Cust." iv. 314; Bunsen, "Egypt's Place," i. 414.

**O'SMAZOME**, a name given by Thenard to the spirit-extract of flesh, on which, as he supposed, its agreeable taste, when cooked, depended. The term is now abandoned by chemists.

**O'SMIUM** (symb. Os; old equiv. 100; new eq. 200; spec. grav. 10) is one of the noble metals which occurs in association with platinum in the form of an alloy with iridium. It may be obtained in the metallic condition by several processes which yield it either in thin, dark-gray glistening scales, or as a dense iron-black mass. It is the least fusible of all the metals; the oxyhydrogen jet volatilising, but not fusing it.

Five oxides of O. are known—viz., the *protoxide* ( $\text{OsO}$ ), which is of a dark-green color, and forms green salts when dissolved in acids; the *sesquioxide* ( $\text{Os}_2\text{O}_3$ ), which has not been isolated; the *dinoxide* ( $\text{OsO}_2$ ), which is black; the *teroxide* ( $\text{OsO}_3$ ), which possesses the characters of a weak acid, but has not been isolated; and *osmic acid* ( $\text{OsO}_4$ ), which occurs in colorless, glistening, acicular crystals, freely soluble in water, and very volatile. At about  $220^\circ$ , this compound gives off an extremely irritating and irrespirable vapor; and hence the name of the metal (from the Greek word *osmê*, odor). It produces a permanent black stain upon the skin, and gives a blue precipitate with tincture of galls. O. also forms four chlorides which correspond in composition to the first four oxides. This metal was discovered by Tennant in 1803.

**O'SMOSE; DIA'LYSIS.** The earlier discoveries of Dutrochet and Graham have been briefly described in the article on **DIFFUSION** (q. v.). The subject has, however, been much extended recently, principally by the investigations of Graham; and as the whole phenomena are exceedingly interesting and important, since secretion, absorption, and various other organic processes are to a great extent dependent on them, some further detail, especially of these later facts, may here be given.

When two different liquids are separated by a bladder or other membrane, or a piece of calico coated with coagulated albumen, there is always a more or less rapid transference of the two liquids in opposite directions through the diaphragm. In certain cases, the explanation given in the article referred to is complete, but in others it appears to be insufficient. Graham has made an extensive series of experiments upon osmose, where distilled water was on one side of the diaphragm, and various liquids and solutions on the other, and has arrived at many general results, of which the following are the more important. The osmose is considered as *positive* when more of the water passes through the diaphragm than of the other liquid. Such substances as gum, gelatine, &c., produce scarcely any effect. Solutions of neutral salts, such as common salt, Epsom salts, &c., follow the ordinary law of diffusion, as if no diaphragm had been interposed. Acid salts in solution, and dilute acids, pass rapidly into the water—or the osmose is *negative*; while alkaline solutions give, in general, a strong *positive* effect.

In all the cases in which an osmotic action occurs which cannot be explained by

capillary forces, there is chemical action on the diaphragm; and conversely, such osmose cannot be produced if the material of the diaphragm be not acted on by the liquids in contact with it.

But the most remarkable results of Graham's later investigations are those relating to Dialysis—I. e., to the separation of the constituents of mixtures, and even the decomposition of chemical compounds, by osmose. The results of his earlier investigations, above given, shew a remarkable difference between two classes of bodies; gum, gelatine, &c., which form viscous solutions, on the one hand; and salts, acids, and alkalies, on the other. The first class he has called *Colloids*; the second, *Crystalloids*. The former are extremely sluggish, the latter comparatively rapid in their action. Thus, of common salt and albumen, under precisely similar circumstances, there pass through the diaphragm in a given time quantities which are as 25 to 1 by weight. Hence, if a solution containing both classes of substances be opposed to pure water, the crystalloids will pass rapidly through the diaphragm, and the colloids slowly. This process promises to be of very great value in medical jurisprudence, as, without introducing any new substance (except the diaphragm and distilled water), we have the means of separating from the generally colloidal contents of animal viscera such poisonous crystalloids as white arsenic, vegetable alkaloids, &c., which by the old methods was in general attended with great difficulty, and often uncertainty. These methods are still in their infancy, but enough is already known to shew how valuable they must soon become to the chemist and the toxicologist. One economical application has been proposed, and shewn to be practicable. When a bladder is filled with the brine of salt beef, and suspended in fresh water, the salt after a time nearly all disappears, and there remains in the bladder a rich extract of meat fit for making soup.

For a brief notice of the speculations which Graham's researches have led him to form as to the nature of *Matter*, we refer to the article on that subject.

**OSMUNDA**, a genus of Ferns, distinguished by spore-cases in branched, stalked masses. The **OSMUND-ROYAL**, **ROYAL**, or **FLOWERING FERN** (*O. regalis*), is the noblest and most striking of British ferns. It is very frequent in the districts of Scotland and Ireland most remarkable for the moisture of their climate, growing in boggy places and the wet margins of woods. It has bipinnate fronds and panicle spore-cases upon altered fronds, which appear as stalks distinct from the fronds, and assimilate the general appearance to that of a phanerogamous plant. It sometimes rises to 11 feet in height. It is found in many parts of Europe, and in North America. It possesses tonic and styptic properties, and its root-stocks were formerly employed in scrofula. The root-stocks abound in a mucilaginous substance, which, being extracted by boiling them in water, is used in the north of Europe instead of starch.

**O'SNABRÜCK**, or **Osnaburg**, a territory occupying the western portion of the Prussian province of Hanover, and embracing the principality of O., the countships of Lingen and of Bentheim, and the duchy of Arensburg-Meppen and the lordship of Papenburg. Area, 2408 square miles; pop. (1875) about 280,000.

**OSNABRÜCK**, the chief town of the territory, lies in the midst of the extended and fruitful valley of the Hase, 80 miles west-south-west of Hanover by railway. It still ranks as the third commercial city of Hanover, although it cannot boast of the important trade which it enjoyed before the establishment of the existing system of the Prussian Zollverein. Pop. (1875) 29,850. O. has thriving manufactories of cigars and tobacco, paper-hangings, and cotton and woollen goods, and extensive works for the preparation of mineral dyes and cement, besides iron, machinery, and carriage manufactories. According to the opinion of antiquarians, O. stands on the site of the ancient Wittekindsburg, which was raised to a bishopric in 788 by Charlemagne, some relics of whom, together with the pretended bones of the martyrs Crispinus and Crispinianus, are preserved in the cathedral—a fine specimen of the Byzantine style of architecture of the 12th century. The Church of St Mary, a noble Gothic building, was erected by the burghers of O. in the 14th c. during their contentions with their haughty ecclesiastical rulers, and contains the grave of Möer, in whose honor a statue was placed in the square of the cathedral in 1856. The signing of the peace of Westphalia in 1648, in an apartment of the town-hall, is commemorated by the preservation of the portraits of all the ambassadors who took part in the treaty. It was decreed in this treaty that the ancient bishopric of O. should thence-



forth be occupied alternately by a Roman Catholic prelate and a Protestant secular prince of the House of Brunswick-Lüneburg; and after having been last held by Frederick, Duke of York, the district of O. was ceded to Hanover in 1803, and the chapter finally dissolved.

**O'SPREY** (*Pandion*), a genus of *Falconidæ*, of which only one species is known (*P. haliaetus*), also called the **FISHING HAWK** or **FISHING EAGLE**, and sometimes the **BALD BUZZARD**. It is singular among the *Falconidæ* in preying *exclusively* on fish; and to this its whole structure and habits are adapted. Its whole length is about twenty-two inches; it is of a dark-brown color, variegated with black, gray, and white. The under parts are white, except a light-brown band across the chest. The bill is short, strong, rounded, and broad. The tail is rather long, the wings are very long, extending beyond the tail; the under surface of the toes remarkably rough, covered with small pointed scales, suited for the securing of slippery prey; the claws not grooved beneath, as in most of the *Falconidæ*. The feathers are destitute of the supplementary plume, which is considerably developed in most of the *Falconidæ*. The intestine differs from that of the other *Falconidæ* in being very slender and of great length.

The O. is chiefly to be seen near the sea, lakes, and large rivers. No bird is more widely diffused; it is found in all quarters of the world; its geographical range including Europe, Asia, Africa, North and South America, and Australia, and both very warm and very cold climates. It is everywhere a bird of passage, retiring from high northern latitudes on the appearance of frost. It occurs on many parts of the British coasts, and is sometimes found in inland districts, but is nowhere abundant in Britain. In some places in Scotland, it still breeds year after year, on the highest summit of a ruined building, or the top of an old tree. It is very plentiful in some parts of North America; and its return in the beginning of spring is hailed with joy by fishermen, as indicative of the appearance of fish. The nest is a huge structure of rotten sticks, in the outer interstices of which smaller birds sometimes make their nests; for the O. never preys on birds, and is not dreaded by them. It is, indeed, of a pacific and timorous disposition, and readily abandons its prey to the White-headed Eagle (or Erne, q. v.). In the days of falconry, the O., being very docile, was sometimes trained and used for catching fish.

**O'SSA**, the ancient name of a mountain on the east side of Thessaly, near Pelion, and separated from Olympus by the vale of Tempa. It is now called Kessavo. The conical summit is covered with snow during the greater part of the year. The ancients placed the seat of the Centaurs and Giants in the neighborhood of Pelion and Ossa.

**O'SSEIN**. This term is applied by chemists to the substance in the tissue of the bones which yields gluten. It is obtained by the prolonged action of dilute hydrochloric acid on bone, which dissolves all the earthy matter. The material thus procured retains the form of the bone without its hardness, and must be repeatedly washed with water, and treated with alcohol and ether to remove traces of salts, fat, &c. It is insoluble in water, but is converted into gluten (one of the forms of gelatine) by the action of boiling water—a transformation which is much facilitated if a little acid be present. The ossein yielded by different kinds of animals requires different times for its conversion into gluten; and that of young animals changes more rapidly than that of adults of the same species. It appears to exist in the bones in a state of freedom—that is to say, not in combination with any of the salts of lime. Fremy's analyses shew that the amount of gluten is precisely the same as that of the ossein which yields it, and that the two substances are isomeric.

**O'SSIAN**, Poems of. Ossian, or Oisín (a word which is interpreted the "little fawn"), a Celtic warrior-poet, is said to have lived in the 3d c., and to have been the son of Fingal or Finn MacCumhail. The poems which are ascribed to him in manuscripts of any antiquity, are few and short, and of no remarkable merit. But in 1763—a Highland schoolmaster, James Macpherson (q. v.), published two epics, "Fingal" and "Temora," and several smaller pieces and fragments, which he affirmed to be translations into English prose of Gaelic poems written by O., and preserved by oral tradition in the Scottish Highlands. Their success was wonderful. They were received with admiration in almost every country of Europe, and were translated not only into French and Italian, but into Danish and Polish. But their

authenticity was challenged almost as soon as they saw the light, and a long and angry controversy followed. That they were what they claimed to be, was maintained by Dr Blair, Lord Kames, the poet Gray, and Sir John Sinclair. That they were more or less the fabrication of Macpherson himself, was maintained by Dr Johnson, David Hume, Malcolm Laing, and John Pinkerton. While this controversy still raged, another sprang up scarcely less angry or protracted. Macpherson made O. a Scotch Highlander, but the Irish claimed him as an Irishman. The fact is he was both: for in those early times, the north-east of Ireland and the west coast of Scotland were practically one country; the people spoke one language, they were of one blood; and the narrow strip of sea that divided them served not as a wall of separation, but rather as an easy passage of communication by means of boats. As to the real authorship of the poems, as the original manuscripts which Macpherson used have never been produced, there will always remain doubts; one thing only we know, that he did use materials of the same nature as the Ossianic traditions that may be picked up from the mouth of the people in many parts of Ireland and the Highlands at the present day; but how far under Macpherson's hands they were remodelled remains a secret. The recent contribution to this question made by J. F. Campbell in his "*Leabhra na Feinne*"—a digest of all the Ossianic ballads either published by others or collected by Mr Campbell himself—has not tended much to clear up the matter. No trace of Macpherson's two large poems has been recovered. On one point all Gaelic scholars seem agreed—that Macpherson did not, and could not have written the Gaelic. Poems ascribed to O., committed to writing in the Highlands in the first half of the 16th c., are printed in the "*Dean of Lismore's Book*" (Edin. 1862), with translations into English and into modern Gaelic. The poems ascribed to O., preserved in Ireland, were published by the Ossianic Society in six volumes (Dublin, 1864—1861). Students of the Ossianic poems will find much assistance from consulting the edition of the Gaelic with a new translation by Dr Clerk of Kilmalie (Edin. 1870). In 1876 the O. controversy was again agitated, but came to nothing.

**OSSIFICATION**, or the formation of bone, is a process to which physiologists have paid much attention, but regarding which there is still considerable difference of opinion. On one point, however, there is a general agreement—*viz.*, that the bones are not in any instance a primary formation, but always result from the transformation and earthy impregnation of some pre-existing tissue, which is most commonly either cartilage or a membrane containing cell-nuclei. At a very early period of embryonic life, as soon, indeed, as any structural differences can be detected, the material from which the bones are to be formed becomes mapped out as a soft gelatinous substance, which may be distinguished from the other tissues by being rather less transparent, and soon becoming decidedly opaque. From this beginning the bones are formed in two ways; either the tissue just described becomes converted into cartilage, which is afterwards replaced by bone, or a germinal membrane is formed, in which the ossifying process takes place. The latter is the most simple and rapid mode of forming bone. When ossification commences, the membrane becomes more opaque, and exhibits a decided fibrous character, the fibres being arranged more or less in a reticulated manner. These fibres become more distinct and granular from impregnation with lime salts, and are converted into incipient bone, while the cells which are scattered among them shoot out into the bone corpuscles, from which the canaliculi are extended probably by resorption. The facial and cranial bones, with the exception of those at the base of the skull, are thus formed without the intervention of any cartilage.

The process of ossification in Cartilage (q. v.) is too complex and difficult to follow in these pages. Some physiologists hold that when ossification is carried on in cartilage, a complete molecular replacement of one substance by the other takes place; while others believe that more or less of the cartilaginous matrix remains, and becomes impregnated with earthy matter, at the same time that gluten is substituted for chondrine (chondrine being the variety of gelatine that is yielded by ossein or bone-cartilage before ossification, while gluten is yielded after that process is established). All the bones of the body, excepting those of the head and face already mentioned, are at first formed, in part at all events, from cartilage.

The time at which ossification commences does not at all follow the order in which the primordial cartilage is laid down. Thus the cartilage of the vertebræ ap-

pears before there is any trace of that of the clavicle, yet at birth the ossification of the latter is almost complete, while that of the former is very imperfect for many years. We will briefly trace the process of ossification as it occurs in the human femur or thigh-bone. Ossification commences in the interior of the cartilage at determinate points, which are hence termed *points or centres of ossification*. From these points the process advances into the surrounding substance. In the second month of fetal life, one of these centres shews itself about the middle of the shaft, and from this point ossification rapidly extends upwards and downwards along the whole length of the shaft. The upper and lower ends remain cartilaginous, and it is not till the last month of fetal life that a second centre appears at the lower end. The third centre, from which the upper end of the bone is ossified, does not appear till about a year after birth. The bone now consists of two extremities or *epiphyses*, with an intermediate shaft or *diaphysis*; and the superior epiphysis is not ossified to the shaft until about the eighteenth, and the inferior until after the twentieth year. At about the fifth year, a fourth ossific centre is developed in the cartilage of the greater trochanter, and a fifth centre appears in the lesser trochanter at about the fourteenth year. These osseous processes, thus developed from special ossific centres, are termed *apophyses*. Most of the long bones are developed in a corresponding way. It is a curious fact (which is of such general occurrence that it may be regarded as a law) that in the skeletons both of man and of the lower animals, the union of the various apophyses to the epiphyses, and of the epiphyses to the diaphysis or shaft, takes place in the inverse order to that in which their ossification began. The advantages derived from this subdivision of the long bones into segments, with interposed cartilaginous plates, are obvious. Besides the greater facilities for growth thus afforded, the flexibility of the bony framework is thereby greatly increased, and its escape from injury during the many falls incidental to this period of life is in no small degree attributable to this cause. See Humphry "On the Human Skeleton," pp. 33—45.

*True Ossification* sometimes occurs as a morbid process; but in many cases the term is incorrectly used (especially in the case of blood-vessels) to designate a hard calcareous deposit, in which the characteristic microscopic appearances of true bone are altogether absent.

In one sense, the osseous tissue that is formed in regeneration of destroyed or fractured bones, may be regarded as due to a morbid, although a restorative action. Hypertrophy of bone is by no means rare, being sometimes local, forming a protuberance on the external surface, in which case it is termed an *exostosis*; and sometimes extending over the whole bone or over several bones, giving rise to the condition known as *hyperostosis*. Again, true osseous tissue occasionally occurs in parts in which, in the normal condition, no bone existed, as in the dura mater, in the so-called permanent cartilages (as those of the larynx, ribs, &c.), in the tendons of certain muscles, and in certain tumors. The peculiar causes of the osseous formations which are unconnected with bone, are not known.

Calcareous deposits or concretions not exhibiting the microscopical character of bone, but often falsely termed ossifications, are of no unfrequent occurrence. Analyses of such concretions occurring in pus, in the valves of the heart, in the muscles, and in the lungs, are given by Vogel in his "Pathological Anatomy of the Human Body;" and in some of these concretions, the phosphate and carbonate of lime occur in nearly the same percentages as those in which they are found in bone. The diseased condition usually but incorrectly called ossification of the arteries, is of sufficient importance to require a brief notice. In consequence of the deposition of earthy or calcareous matter in the middle coat of the artery, the vessel loses all its elasticity, and becomes a rigid, unyielding tube. All parts of the arterial system are liable to this change; but it is more frequently met with in the ascending portion and arch of the aorta, than in any other part of that vessel, and is more common in the lower extremities than the upper. The affection is usually partial, but occasionally it appears to be almost universal. Thus, Dr Adams has recorded a case, in the Dublin Hospital Reports, in which no pulsation could be felt in any part of the body, and even the heart offered no other sign of action than a slight undulating sound. Old age strongly predisposes to this diseased condition, and probably few very aged persons are altogether exempt from it. There is also reason to believe that gout and rheumatism favor these calcareous deposits. This condition of the arteries may give rise to aneurism, to gangrene of the extremities in aged

persons, and to atrophy, and consequent feebleness of the brain and heart. (The coronary arteries, which supply the heart with the arterial blood necessary for its own nutrition, are very often, although not always, ossified in angina pectoris.) Moreover, this condition of the vessels very materially increases the risk from severe accidents and surgical operations.

**OSTADE**, Adrian van, a celebrated painter and engraver of the Dutch school, was born at Lübeck, in North Germany, in 1610. His teachers were Franz Hals and Rembrandt. He followed his art at Haarlem, till the French army of Louis XIV. threatened Holland, when he removed to Amsterdam, where he spent the remainder of his life. He died in 1685. Country dancing-green, farm-yards, stables, the interiors of rustic hovels and beer-shops, are the places which he loves to paint; and his persons are for the most part coarse peasant carls, drunken tobacco-smokers, or peasant women employed in country work. In everything he did there is a bright and vivid naturalness. Not equal to Teniers in originality and quiet humor, he surpasses him in the force and fineness of his execution, though he is not free from triviality and repetitions, and inaccuracies in drawing. He was a prolific painter, and his works are to be found in all the museums and collections of the Netherlands, Germany, France, and England. They have been well engraved by Vischer, Suyderoef, and himself.—**ISAAC VAN OSTADE**, brother of Adrian, also a painter, was born at Lübeck in 1612, and died at Amsterdam in 1671. He did not equal his brother, whose style he labored to imitate.

**OSTASHKO'FF**, a manufacturing district town of Great Russia, in the government of Tver, stands on the south-east shore of Lake Seligner; lat.  $57^{\circ} 10' N.$ , long.  $83^{\circ} 0' E.$  The first settlements on this site are said to have taken place in 1280. Pop. (1867) 9238. Skin-dressing, boot-making, and fishing in the neighboring lakes are the principal employments of the inhabitants. The woods in the vicinity furnish bark for tanning purposes, and charcoal for the blacksmiths' shops. There are in O. 37 tanyards, in which skins are dressed, and Russian leather prepared to the amount of £80,000 annually. The leather prepared at Savines tanyard is known in England, Austria, Italy, and North America. 280,000 pairs of boots are made annually, and 400 men and 1000 women are engaged in the manufacture. Manufactures of hatchets and scythes are also carried on. The commerce of O. is small, however, owing to its remote distance from important lines of communication.

**OSTENDE**, a strongly fortified town of the Belgian province of West Flanders, on the German Ocean, at the opening of the Ostende and Bruges Canal, in  $51^{\circ} 14' N.$  lat., and  $2^{\circ} 55' E.$  long. Pop. 17,351. Notwithstanding its proximity to the sea, the shallowness of the harbor prevents large ships from entering the port except at high tide. It ranks, however, as the second seaport of the kingdom, Antwerp being the first, and is fortified with walls and broad ditches. It has some good manufactories for linens, sailcloths, and tobacco, and several sugar, salt, and candle works. From its position as a station for the steamers plying daily between London, Dover, and the continent, and as the terminus of various branches of railway in connection with the great French and German lines, it is a lively and active place of transport traffic, and is resorted to in the summer as a bathing-place by 12,000 persons from all parts of the continent. It is, moreover, an important station for oyster, cod, and herring fishing; has a good naval school, some ship-yards, an efficient staff of pilots, and is the seat of a commercial tribunal and a chamber of notaries. Its imports in 1878 amounted to 16,000,000 francs; its exports to 18,000,000 francs. The harbor is furnished with a light-house, and is provided with an admirably constructed stone promenade for the accommodation of the public. O. is memorable for the protracted siege which it underwent from 1601 to 1604, terminating in the surrender of the Dutch and Flemish garrison to the Spanish commander, Spinola.

**OSTEOCOLA**, a kind of size or glue made by removing the mineral matter from bones, and dissolving the gelatine. Its common name is bone-glue.

**OSTEOLE'PIS** (Gr. bone-scale), a genus of fossil ganoid fish peculiar to the Old Red Sandstone. It is separated from its allies by having the two anal and two dorsal fins alternating with each other. Seven species have been described.

**OSTEOLOGY** (Gr. *osteia*, the bones) is that department of anatomy which treats

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of the chemical and physical properties of the osseous tissue, and of the shape, development and growth, articulations, &c., of the various bones of which the skeleton is composed. See BONE, OSSIFICATION, SKELETON, &c.

OSTERO'DE, a small town of Hanover, in the principality of Grubenhagen, situated at the western base of the Harz Mountains, on the Söse, an affluent of the Leine, 30 miles north-east of Göttingen. It contains large grain stores, from which the miners of the neighborhood and their families are supplied with grain at a low and fixed rate. Cotton, woollen, and linen fabrics and hosiery are extensively manufactured, also lead and copper. Pop. (1875) 5658.

O'STIA, a city of Latium, at the mouth of the Tiber, about 16 miles from Rome. It is said to have been founded by Ancus Martins, and was regarded as the oldest Roman colony. It first acquired importance from its salt-works, the establishment of which is attributed to Ancus Martins, and afterwards as the port where the Sicilian, Sardinian, and African corn shipped for Rome was landed; yet its name first occurs during the second Punic war. It was long, too, the principal station of the Roman navy; but its harbor was exceedingly bad, and gradually the entrance became silted up with alluvial deposits, so that vessels could no longer approach it, but were compelled to ride at anchor in the open roadstead, and to disembark their cargoes there. At length the Emperor Claudius dug a new harbor or basin two miles north of O., and connected it with the Tiber by a canal. It was named the *Portus Augusti*, and around it soon sprung up a new town called *Portus Ostiensis*. *Portus Urbis*, *Portus Romæ*, and often simply *Portus*. Yet it was not till nearly the close of the Roman empire that the prosperity of O. as a city began to decline. Its decay, however, was rapid, and in the 8th c. it was a mere ruin. During the middle ages, a village—the modern O.—was built about half a mile above the ancient one; but it has not more than one hundred permanent inhabitants, who still carry on the manufacture of salt, established in the pre-historic times of ancient Rome. The ruins of O. extend for a mile and a half along the banks of the Tiber, and are nearly a mile in breadth. See Nibby's "*Dintorni di Roma*" (vol. ii.).

OSTRA'CION, a genus, and OSTRACIONIDÆ, a family of fishes of the order *Plectognathi*. They are remarkably distinguished by having the whole body covered with an inflexible tuberculated coat of mail, formed of six-sided bony scales or plates combined in a tessellated quincuncial manner; the fleshy lips, the fins, and the tail protruding through holes in the armor. The gill-opening appears in the armor as a mere slit, bordered with a skinny edge, but there is a true gill-cover within. There are no ventral fins. The vertebrae are generally coalescent. There is little muscular substance, and in some species it is reputed poisonous; but the liver is large, and yields much oil. Some of the species are known by the names of *TUNNY-FISH* and *COFFER-FISH*. They are mostly found in the Indian and American seas. None are British.

O'STRACISM, a right exercised by the people of Athens of banishing for a time any person whose services, rank, or wealth appeared to be dangerous to the liberty of his fellow-citizens, or inconsistent with their political equality. It was not a punishment for any particular crime, but rather, as has been observed, a precautionary measure to remove such leaders as were obviously exercising a dangerous ascendancy in the state. Ostracism was introduced by Cleisthenes about the beginning of the 6th c. B.C., after the expulsion of the Peisistratides. The people were annually asked by the Prytanes if they wished to exercise this right, and if they did, a public assembly was held, and each citizen had opportunity of depositing, in a place appointed for the purpose, a potsherd (*ostrakon*) or small earthen tablet, on which was written the name of the person for whose banishment he voted. Six thousand votes were necessary for the banishment of any person; but the greatest men of Athens—Miltiades, Themistocles, Cimon, Alcibiades, &c.—were subjected to this treatment. The banishment was at first for ten years, but the period was afterwards restricted to five. Property and civil rights or honors remained unaffected by it. Alcibiades succeeded in obtaining the final abolition of ostracism, of which, however, Plutarch and Aristotle speak as a necessary political expedient, and its utility has been very ably defended in modern times by Mr Grote ("*History of Greece*," vol. iv. pp. 200 et seq.).

O'STRICH (*Struthio*), a genus of birds of the order *Grallatores*, and tribe

*Brevipennis* (q. v.), in Cuvier's system—the order *Cursores* (or Runners) of some ornithologists. In this genus the bill is of moderate length, broad, flattened, rounded at the tip, the mandibles flexible; the head small; the neck long; the legs long (both tibia and tarsus) and very robust, the lower part of the tibia, as well as the tarsus, naked; the feet have only two toes, of which the inner is the largest, and has a short claw, the outer has no claw; the wings are too short to be used for flight, but are useful to aid in running; the plumage is lax and flexible; the wings and tail have long soft drooping plumes. Only one species is known (*S. camelus*), a native of the sandy deserts of Africa and Arabia; the South American ostriches, or *Nandus* (q. v.) constituting a distinct genus. The O. is the largest of all birds now existing, being from six to eight feet in height to the top of its head, and an adult male weighing from two to three hundred pounds. The male is rather larger than the female. The head and upper part of the neck are scantily covered with a thin down, through which the skin is visible. The young have the head and neck clothed with feathers. The general plumage is glossy black in the adult male, dark gray in the female and young, with a slight sprinkling of white feathers; the long plumes of the wings and tail are white, occasionally marked with black. On each wing are two plumelike shafts, not unlike porcupine's quills. The inner toe is very large, about seven inches long, and its claw hoof-like. Whilst the sternum is destitute of a keel, and the muscles which move the wings are comparatively weak, those which move the legs are of prodigious strength, so that the O. is not only capable of running with great speed, but of striking such a blow with its foot as to make it too formidable for the leopard and other large beasts of prey to assail it. It has been often known to rip open a dog by a single stroke, and a man is recorded to have suffered the same fate. The eyes of the O. are large, and the lids are furnished with lashes. Its sight is keen, so that it descries objects at a great distance in the open desert.

The O. shuns the presence of man, but is often to be seen in near proximity to herds of zebras, quaggas, giraffes, antelopes, and other quadrupeds. It is gregarious, although the flocks of ostriches are not generally very large. It is polygamous, one male usually appropriating to himself, when he can, from two to seven females, which seem to make their nest in common, scooping a mere hole in the sand for this purpose. Each female is supposed to lay about ten eggs. The eggs are all placed on end in the nest, which often contains a large number, whilst around it eggs are generally to be found scattered on the sand. Concerning these, it has been supposed that they are intended for the food of the young birds before they are able to go in quest of other food; an improbable notion, not supported by evidence. It seems at least as likely that these scattered eggs are laid by females waiting whilst the nest is occupied by another, and that they are lost to the ostriches, and no more regarded. Contrary to a very generally received opinion, the O. does not leave her eggs to be hatched entirely by the heat of the sun; or, if this be the case in the warmest regions, it is otherwise in the more northern and southern countries in which this bird is found, and by a remarkable instinct, the O. sits upon the eggs by night, when the cold would be too great for them, and leaves them to the sun's heat during the day.

The O. feeds exclusively on vegetable substances, its food consisting in great part of grasses and their seeds; so that its visits are much dreaded by the cultivators of the soil in the vicinity of its haunts, a flock of ostriches soon making terrible devastation of a field of corn. The O. has a very large crop, a strong gizzard, and a pretty large *proventriculus* between the crop and the gizzard: the intestines are voluminous, and the cæca long, with a remarkable spiral valve. There is a receptacle in which the urine accumulates, as in a bladder, a thing very uncommon in birds.

The O. swallows large stones, as small birds swallow grains of sand, to aid the gizzard in the trituration of the food; and in confinement, has often been known to swallow very indiscriminately whatever came in the way, pieces of iron, bricks, glass, old shoes, copper coins, &c. Its instincts do not suffice to prevent it from swallowing very unsuitable things; copper coins were fatal in one instance, and a piece of a parasol in another.

The O. is very patient of thirst, or is capable of subsisting for a long time without water. It often supplies the want of water by eating the gourds or melons of the desert, to which even the lion is said to resort on the same account.

The speed of the O., when it first sets out, is supposed to be not less than 60 miles

an hour; but it does not seem to be capable of keeping up this speed for a long time. It is successfully hunted by men on horseback, who take advantage of its habit of running in a curve, instead of a straight line, so that the hunter knows how to proceed in order to meet it and get within shot. It is often killed in South Africa by men who envelop themselves in ostrich skins, and admirably imitating the manners of the O., approach it near enough for their purpose, without exciting its alarm, and sometimes kill one after another with their poisoned arrows.

The strength of the O. is such that it can easily carry two men on its back.

The voice of the O. is deep and hollow, not easily distinguished, except by a practised ear, from the roar of the lion. It also more frequently makes a kind of cackling; and when enraged and striking violently at an adversary, hisses very loudly.

The flesh of the O. is not unpalatable when it is young, but rank and tough when old. It is generally believed to have been prohibited as unclean to the Jews (*Lev. xi. 16*), although the name is translated *owl* in the English Bible. There are frequent references to it in the Old Testament.

The eggs of the O. are much esteemed as an article of food by the rude natives of Africa, and are acceptable even to European travellers and colonists. Each egg weighs about three pounds, and is thus equal to about two dozen ordinary hen's eggs. The egg is usually dressed by being set upright on a fire, and stirred about with a forked stick, inserted through a hole in the upper end. The thick and strong shell is applied to many uses, but particularly is much employed by the South African tribes for water-vessels. The reader will probably recollect the interesting plate in Livingstone's "Travels" of women filling ostrich shells with water. In taking ostrich eggs from the nest, the South African is careful not to touch any with the hand, but uses a long stick to draw them out, that the birds may not detect the smell of the intruder, in which case they would forsake the nest; whilst otherwise, they will return, and lay more eggs.

**OSTRICH-FARMING.** Attempts are being made to increase the supply of ostrich feathers, or to facilitate the procuring of them, by establishing farms—enclosures where the birds can grow and breed in tameness. In 1869, the Bulletin of the Société d'Acclimatation contained a note from Dr Vayasseur, discussing the question whether the ostrich of South America, the Nandu (q. v.) or *Rhea*, can be acclimatised in France. When caught, they are easily tamed; and this is the circumstance which has suggested the idea of naturalisation. They must not be placed in cages, but must have free range to walk about, secured simply by a leg-guard. Dr Vayasseur expressed an opinion "that the South American ostrich could live without difficulty in the north of France; that there is no difficulty in domesticating it; and that it will feed on almost anything that is given to it, however coarse."

At a meeting of the Cape Agricultural Society of Cape Town in 1864, Mr L. von Maltitz gave an account of his experience in ostrich-farming at Colesberg. Towards the end of 1868 he purchased seventeen young ostriches of three or four months old, and placed them in an enclosure of 800 acres, over which they had free run. They subsisted wholly on the herbage of the enclosure, save a little grain given to them now and then. The opinion he formed from many months' observation was, that 35 ostriches might find sufficient sustenance upon 800 acres of good grazing-ground. In April 1864, he had the wings of the birds cut at the point where the well-known ostrich feathers grow; and they were fit again to cut six months later. The birds were so tame that they allowed themselves to be handled, and their plumage minutely examined. Having caused the birds and the feathers to be examined by experienced dealers, he found that the largest feathers, of which there are twenty-four on the wing of each male bird, were worth £25 per lb.; and that one plucking of his seventeen birds would yield £10 each on an average. The birds cost him about £5 each. Since this experiment of Mr Von Maltitz, O.-F. has become a recognised form of industry at the Cape. The price of a healthy bird a week old is £10; at six months, £30. The feathers may be plucked when the bird is a year old, and each crop is worth about £7 a bird. The price of the feathers ranges, according to quality, from a few shillings per lb. to £40 or £50. In 1875 there were 32,247 domesticated ostriches in Cape Colony. It is found that 600 acres of grass are required to feed 80 birds; and when the grass is poor, the ostriches are fed on supplies of shrubs and occasionally on Indian corn. The adult birds require to be kept in separate pad-

docks, which are generally surrounded by wire-fencing. The egg of the ostrich, though coarse, is reasonably good food; but the naturalisation of the bird derives most of its prospective importance from the feathers, for which there is at all times a large demand in the chief European countries.

The long plumes of the O. have been highly valued for ornamental purposes from very early times, and continue to be a considerable article of commerce, for the sake of which the O. is pursued in its native wilds. See OSTRICH-FARMING.

The O. is often to be seen in Britain in confinement, and readily becomes quite tame and familiar, although still apt to be violent towards strangers. Great numbers were exhibited in the public spectacles by some of the Roman emperors; and the brains of many ostriches were sometimes presented in a single dish, as at the table of Heliogabalus.

OSTRICH FEATHERS are occasionally borne as a heraldic charge, and always represented drooping. Three white ostrich feathers are the well-known badge of the Prince of Wales. According to common tradition, they were assumed in consequence of Edward the Black Prince having plucked a plume of ostrich feathers from the casque of John of Luxemburg, king of Bohemia, who fell by his hand at Crecy. There is, however, no doubt that ostrich feathers were previous to that time a cognizance of the Plantagenets. Prince Henry, eldest son of James I., first established the present arrangement of the three ostrich feathers within a prince's coronet.

OSTROG, a small district town of West Russia, in the government of Volhynia, 100 miles west of Jitomir. Here, in the reign of Constantine of Ostrog, a school and typography were established, and the first Slavonic Bible printed in 1568. Pop. (1867) 3814.

O'STROGOTHS. See GOTHs.

OSTU'NI, a city of South Italy, in the province of Lecce, 22 miles west-north-west from Brindisi, on the railway between Ancona and Brindisi. It stands on a steep hill. A considerable trade is carried on, chiefly in the produce of the neighborhood, and the city is a flourishing one. Pop. (1871) 14,422.

OSU'NA, a town of Spain in the province of Seville, and 48 miles east-south-east of the city that name, stands in a fertile plain, and on a triangular hill crowned by a castle and the collegiate church. It stands in the midst of a highly fertile plain, productive in grain, olives, almonds, &c. An extensive panoramic view is obtained from the castle. The collegiate church, in the mixed Gothic and cinque-cento style, was built in 1534. It was pillaged by Soult of 5 cwt. of ancient church plate, and was converted by him into a citadel and magazine. Pop. 15,500, who are engaged in agriculture and in the manufacture of linen goods, and iron and earthenware.

OSWEGO, a city and port of entry, in New York, U. S., is situated at the mouth of Oswego River, on Lake Ontario, at the extremity of the Oswego Canal, a branch of the Erie, and is a station on several railways. It is a handsome city, with streets 100 feet wide, crossing at right angles, with costly government buildings, custom-house, court-house, post-office, city hall, hospital, orphan asylum, library, 16 churches, 2 daily and 2 weekly newspapers, excellent schools, &c. It has a large trade with the lake country and Canada, and exports about 12,000,000 dollars per annum. On the river are 14 flour-mills, making 600,000 barrels of flour a day, with 11 elevators for unloading vessels for 45,000 bushels an hour. Among the manufactures is that of 13,000,000 lbs. of what is known as Oswego flour, made from Indian corn. The lumber received in 1874 measured 210,814,573 feet, besides 47,605,063 shingles, 2,654,126 pieces of heading, &c. There are a fort and a navy-yard, and an excellent harbor recently constructed. Pop. (1870) 20,910; (1880) 21,116.

OSWEGO TEA, a name given to several species of *Monarda*, particularly *M. purpurea*, *M. didyma*, and *M. kalmitana*, natives of North America, because of the occasional use of an infusion of the dried leaves as a beverage. They belong to the natural order *Labiata*, somewhat resemble mints in appearance, and have an agreeable odor. The infusion is said to be useful in intermittents, and as a stomachic. Some other species of *Monarda* are used in the same way.

O'SWESTRY, a thriving market town and municipal borough of England, in the county of Salop, 18 miles north-west of Shrewsbury. The stone pillars of its au-



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cient gateways still stand in the streets. There are also scanty remains of a castle, said to have been the ancestral seat of Walter Fitzalan, progenitor of the royal House of Stuart, who, during the troubles of the reign of King Stephen, fled hence to Scotland, and became steward to David I., king of Scotland. O. is the centre of an extensive agricultural district: it has extensive market-places, and its weekly market for agricultural produce and cattle is very largely attended. There are corn mills and coal-mines in the vicinity. O. contains the offices and works of the Cambrian Company, and is favorably situated as a railway centre. Pop. (1871) of municipal borough, 7806. O. is said to derive its name from Oswald, king of Northumbria, slain here in 642. Near the town is Oswald's Well, a fine spring of water; and "Old O." an ancient encampment.

OSYMA'NDYAS, the name of a great king of Egypt, mentioned by Diodorus and Strabo, who reigned, according to these authors, as the 37th successor of Sesotris. He distinguished himself, according to these authors, by his victories, and invaded Asia with an army of 400,000 men and 20,000 cavalry, and conquered the Bactrians, who had been rendered tributary to Egypt by Sesotris. In honor of this exploit, he is said by Hecataeus to have erected a monument which was at once a palace and a tomb, and which, under the name of *Osymandion*, was renowned for its size and splendor in later times. It was said to be situated in the necropolis of Thebes, or at Gournah, and close to the sepulchres of the concubines of the god Amen Ra. The *Osymandion* is generally believed to be represented by the extant ruins of the palace of Rameses III. at Medinet Haboo, though great difficulty has been felt in reconciling the descriptions of its magnificence in ancient writers with the dimensions of the modern relic; and Letronne, in his "Tombeau d'Osymandyas" (Par. 1831), has even ventured to suppose that it was an imaginary edifice invented by the Greeks from their acquaintance with the great palaces of Thebes, but this scepticism is considered extreme. The name of O. is difficult to recognise amongst the Egyptian kings, the nearest approach to it being one of the Setis, either the 1st or 2d, called after death, Asiri-Meneptah. Others consider O. the Ismenides of Strabo, or the Mendes of Herodotus. The name of Aeneophis may also lie concealed in his name, so much ambiguity pervades the subject.

Diodorus, l. 48 to 50; Strabo, xvii. p. 8, 11—18; Juvenal, xv. 88; Letronne, "Mém. de l'Inst." ix. p. 321; Champollion, "Lectures Ecrites," p. 200, 203; Champollion-Figeac, "L'Egypte," 69, 291, 318—315.

OTA'GO, one of the most recent settlements, but, at the same time, the most prosperous, populous, and likely to become the most influential province of New Zealand (q. v.). Since the reincorporation of Southland—a portion of its territory which, in 1861, was parted from O. and raised into a small separate province, an experiment which failed in a short time—it is now the most southern province of South Island (see NEW ZEALAND). O. is bounded on the north by the province of Canterbury, and on the west, east, and south by the Pacific Ocean; is in length 200 miles, 160 miles in breadth, and possesses an invaluable line of coast which measures 600 miles. The entire area is about 15,500,000 acres—over 24,000 square miles. Pop. in 1871, 69,600; in 1877, estimated at 115,650. The chief rivers are the Waitaki, the Clutha, and the Mataura, all of which flow south-south-east, and are navigable to a greater or less extent. The western regions of O. remain unsurveyed, but are known to be covered with high, and in many cases snow-capped mountains, stretching along the whole line of coast, and extending inland for upwards of 60 miles. East and north-east from the Mataura River to the shore the surface is well known, and consists of mountain-ranges alternating with valleys, and extending parallel to the sea and to each other as far inland as the valley of the Manterikia, one of the first affluents of the Clutha. The climate of O. is exceedingly healthy and invigorating; frost and snow are unknown except in the higher ranges, and rain, though sufficiently abundant to answer the demands of agriculture, does not interfere with outdoor occupations. All the English fruits and flowers, with some trifling exceptions, are grown here to perfection. The northern and interior districts of the province are eminently adapted, as regards both soil and climate, for agriculture as well as cattle-breeding. The western districts are rugged, and covered with forests; but in the eastern regions are many fertile and well-watered tracts, admirably suited for the production of corn, and the rearing of cattle and sheep. In mineral wealth the province of O. is remarkably rich. Coal, iron, copper, silver,

lead, &c., have been found, and useful earths and clays are abundant. Gold has been found in small quantities in other provinces of New Zealand, as in Auckland and Nelson Province; but by far the most important gold-fields of the colony are in the province of Otago. Gold was first discovered here by Mr Gabriel Read in June 1861, in a gully, since called Gabriel's Gully, on the Tuapeka, an affluent of the Clutha, in a direct line 37 miles west of Dunedin. Read placed his discovery in the hands of government, and was presented by the Provincial Council with £500 as a reward. In less than two months from the discovery of gold, 3000 people were at work in the Tuapeka valley, and were obtaining 6000 oz. a week. From this time gold-mining became a staple employment. A "rush" was made from Australia; Dunedin, formerly the village capital of the province, now rapidly increased in size and trade, new fields were discovered, and the immigration-lists were immensely swelled. From June 1861 to June 1863, 700,000 oz., worth nearly £3,000,000, were obtained. The most productive gold-field hitherto discovered is the Arrow River District, in the vicinity of Lake Wakatipu. This district was made known in November 1863, and from that time to the end of October 1863, 237,655 oz.—value £956,620—were forwarded to Dunedin by escort. The value of the gold exported from O. up to the end of 1876 was £13,602,366; in 1876 it was £487,632. In 1874 the imports amounted in value to £2,835,334; the exports to £2,004,322. Gold, wool, timber, and agricultural produce are the principal articles of export. In agriculture, the chief growths are wheat, oats, barley, potatoes, and hay. In 1875 the extent of land under cultivation, and the amount of these products of the farm, were reported to be as follows: wheat, 23,116 acres, supplying 980,128 bushels; oats, 80,788 acres, 3,018,148 bushels; barley, 5055 acres, 168,437 bushels; potatoes, 3342 acres, 18,420 tons; hay, 7692 acres, 11,899 tons. The first band of settlers reached the shores of O. in the spring of 1848. The capital is Dunedin (q. v.). The population of this city and its suburbs, Roslyn and Caversham, was, in 1871, 21,511. O. was originally a class colony connected with the Free Church of Scotland; but the influx of immigrants consequent on the discovery of gold has obliterated its distinctive character.

OTAHEITE. See TAHITI.

OTA'LGIA (Gr. *ot*, the ear, and *algos*, pain) is neuralgia of the ear. It occurs in fits of excruciating pain, shooting over the head and face, but it is not accompanied by fever, nor usually by any sensation of throbbing. Its causes and treatment are those of neuralgia generally, but it is particularly caused by caries of the teeth, which should always be carefully examined by a dentist in these cases. When patients complain of *carache*, the pain is far more commonly due to *otitis*, or inflammation of the tympanic portion of the ear, a much more serious affection.

OTARY (*Otaria*), a genus of the Seal family (*Phocidae*), distinguished from the rest of the family by a projecting auricle or auditory couch (often popularly called "external ear"), and by a very remarkable character, a double cutting edge in the four middle upper incisors. The membrane which unites the toes of the hind-feet is prolonged into a flap beyond each toe. The fore-legs, as if intended exclusively for swimming, are placed further back in the body than in the true seals, giving the otaries the appearance of having a longer neck. The hind-legs are more like the fore-legs than in the true seals.—The SEA LION (*O. jubata* or *O. Stelleri*) of the northern seas is about 15 feet in length, and weighs about 16 cwt. It inhabits the eastern shores of Kamtschatka, the Kurile Islands, &c., and is in some places extremely abundant. It is partially migratory, removing from its most northern quarters on the approach of winter. It is to be found chiefly on rocky coasts and islet rocks, on the ledges of which it climbs, and its roaring is sometimes useful in warning sailors of danger. It is much addicted to roaring, which, as much as the name of the old males, has obtained for it the name of sea lion. The head of this animal is large; the eyes very large; the eyebrows bushy; the hide thick; the hair coarse, and reddish; a heavy mass of stiff, curly, crisp hair on the neck and shoulders. The old males have a fierce aspect, yet they flee in great precipitation from man; but if driven to extremities, they fight furiously. Sea lions are capable of being tamed, and become very familiar with man. They are polygamous, but a male generally appropriates to himself only two or three females. They feed on fish and the smaller seals.—The sea lion of the southern seas, once supposed to be the same, is now generally believed to be a distinct species, and, indeed, more than one species are supposed to inhabit the southern seas.—The UA-

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**FINE SEAL, URSINE O., or SEA BEAR** (*O. ursina*), is an inhabitant of the Northern Pacific. It is scarcely 8 feet long. The hinder limbs being better developed than in most of the seals, it can stand and walk almost like a land quadruped. The muzzle is prominent, the mouth small, the lips tumid, the whiskers long; the tip of the tongue is bifurcated, the eyes are large, the skin is thick, the hair long, erect, and thick, with a soft underclothing of wool. The food consists of sea otters, small seals, and fish. The ursine seal is polygamous, a strong male appropriating to himself from eight to fifty females. It swims with great swiftness. It is fierce and courageous. Its skin is much prized for clothing in the regions in which it abounds. As in the case of the sea lion, it is doubtful if the geographical range of the sea bear extends to the southern seas, or if it is represented there by a similar species. Several other species of *O.* are inhabitants of the Pacific and Southern Oceans. The **FUR SEAL** (*O. Falklandica*) is one of these. It is found on the Falkland Islands, South Shetland, &c. It is of a long and slender form, with broad head, and clothed with soft, compact, grayish-brown hair, amongst which is a very soft, brownish fur. It is gregarious and polygamous. When South Shetland was first visited, its seals had no apprehension of danger, and unsuspectingly remained whilst their fellows were slain and skinned; but they have since learned to be upon their guard. The skin of the fur seal is in great demand, chiefly for ladies' mantles, and was much used for making a kind of soft fur cap, which was very common thirty or forty years ago.

**OTCHAKOV**, a small town and seaport of South Russia, in the government of Kherson, surrounded on all sides by a barren steppe, stands at the western extremity, and on the north shore of the estuary of the Dnieper, 40 miles east-north-east of Odessa. It traces its foundation to the very earliest times, and is supposed by some to be the spot where stood the Grecian colony Olbia; by others, to be Tomi, the scene of Ovid's banishment. At the end of the 15th c., the khan of the Crimea built here a strong fortress. Its present name occurs for the first time in 1557. During the Russian wars with Turkey in the 18th c., O. was alternately the property of each, until it was taken by Potemkin in 1783, and definitively annexed to the Russian dominions. The vicinity of Odessa is fatal to the development of foreign commerce at its port. Pop. (1867) 5140, the greater part of whom are Jews, and are employed in salting fish for transport to Little Russia.

**OTHTMAN IBN AFFAN**, third calif of the Moslems, was born about 574. He belonged to the family of the prophet, and was cousin-german of Abu Sofian. One of the early converts to Islam, he was one of its most zealous supporters, and linked himself still more strongly to Mohammed by becoming his son-in-law and private secretary. He was elected to succeed Omar in the califate in December 644, and a most unworthy successor he proved to be. The Moslem empire, however, continued to extend itself on all sides till the insane nepotism of O. gave its progress a sudden check. The able and energetic leaders who had been appointed by Omar were superseded by members of his own family, and of that of Abu Sofian; and the consequences were what might have been expected. Egypt revolted, and the calif was compelled to reinstate Amru in the government of that country, and several other rebellions were only quelled by a similar restoration of the previous governors. Zealous Moslems deeply deplored the folly of their chief, and were indignant at seeing the chair of the prophet occupied by O., while Abu-bekr, and even Omar, were accustomed to seat themselves two steps below it. Emboldened by the knowledge of his vacillating and cowardly disposition, they showered upon him reproaches and menaces; but the bearer of their remonstrances having been bastinadoed by O.'s order, a general revolt ensued. O. averted the crisis by unconditional submission; but having soon after attempted to put to death Mohammed, the son of the Calif Abu-bekr, the latter made his appearance at Medina at the head of a troop of malcontents, and forcing his way to the presence of O., stabbed him to the heart. O. was of a mild and pacific disposition, but he was at the same time most ambitious of power, though after his accession to supreme authority, he shewed himself to be, either from age or natural imbecility, deplorably deficient in those energetic virtues, without which the control of a warlike people and the management of a mighty empire such as that of the Moslems, were utterly impossible. O. was the first to cause an authentic copy of the Koran to be composed.

**OTHMAN**, Othoman, or Osman I., surnamed *Al ghazi* ("the conqueror"), the founder of the Turkish power, was born in Bithynia in 1259. His father, Orthogrul, the chief of a small tribe of Oğuzian Turks, had entered the service of Ala-ed-din Kaikobad, the Seljuk sultan of Iconium, and had rendered important services to that monarch and his successors in their wars with the Byzantines and Mongols. Orthogrul dying in 1289, after a rule of more than half a century, his tribe chose his son Osman (i.e., the "young bastard,") as his successor. O. trod in his father's footsteps; and on the destruction of the sultanate of Iconium in 1299 by the Mongols, succeeded in obtaining possession of a portion of Bithynia. He had previously subjugated many of the neighboring Oğuzian chiefs, and this new accession of territory rendered him powerful enough to attack the Byzantines with success. In July 1299, he forced the passes of Olympus, and took possession of the whole territory of Nicæa, with the sole exception of the town of that name, which resisted his efforts for five years longer. In 1301, he defeated the Emperor Andronicus II. at Baphræon; in 1307, he incorporated the province of Marmara in his dominions; and continued till his death, in 1326, steadily to pursue his plans of conquest. "Othman," says Knolles, "was wise, politic, valiant, and fortunate, but full of dissimulation, and ambitious above measure; not rash in his attempts, and yet very resolute; to all men he was bountiful and liberal, especially to his men of war and to the poor. Of a poor lordship, he left a great kingdom (Phrygia, Bithynia, and the neighboring districts), having subdued a great part of Asia Minor, and is worthily accounted the first founder of the Turks' great kingdom and empire." O. assumed the title of sultan (though this is denied by many historians) on the extinction of the Iconium sultanate in 1299, held his court at Kara-Hissar, and struck money in his own name. From him are derived the terms Ottomans, Othomans, and Osmanli or Osmanli, which are employed as synonymous with Turks. SEE OTTOMAN EMPIRE.

**O'THO**, Marcus Sulpicius, Roman emperor, was descended of an ancient Etruscan family, and was born 82 A.D. He was a favorite companion of Nero, who appointed him governor of Lusitania, in which office he acquitted himself creditably. On the revolt of Galba against Nero, O. joined himself to the former; but being disappointed in his hope of being proclaimed Galba's successor, he marched at the head of a small band of soldiers to the forum, where he was proclaimed emperor, and Galba was slain, 69 A.D. O. was recognised as emperor over all the Roman possessions, with the exception of Germany, where a large army was stationed under Vitellius. The first few weeks of his reign were marked by an indulgence towards his personal enemies, and a devotion to business, which, though at total variance with his usual habits, excited in the minds of his subjects the most favorable hopes. But the tide of rebellion raised in Germany by Valens and Cæcina during the reign of Galba had by this time gathered strength, and these commanders having prevailed upon Vitellius, who had become a mere good-humored glutton, to join his forces to theirs, the combined army poured into Italy. O. fortunately possessed several able generals, who repeatedly defeated the rebels; but the prudence of some among them in restraining the enthusiasm of their troops, who wished further to follow up their victories, was unfortunately considered as cowardice or treason, and produced dissensions in O.'s camp. This state of matters becoming known to the generals of Vitellius, encouraged them to unite their armies, and fall upon the forces of Otho. An obstinate engagement took place near the junction of the Adia and the Po, in which the army of O. was completely routed, and the relics of it went over on the following day to the side of the victor. O., though by no means reduced to extremity, resolved to make no further resistance; settled his affairs with the utmost deliberation; and then stabbed himself, on the 15th of April 69 A.D.

**OTHO I.**, or the Great, son of the Emperor Henry I. of Germany, was born in 912, and after having been early recognised as his successor, was, on the death of his father in 936, formally crowned king of the Germans. His reign was one succession of eventful and generally triumphant wars, in the course of which he brought many turbulent tribes under subjection, acquired and maintained almost supreme power in Italy, where he imposed laws with equal success on the kings of Lombardy and the popes at Rome, consolidated the disjointed power of the German emperors, and established Christianity at many different points in the Scandinavian and Slavonic lands, which lay beyond the circuit of his own jurisdiction. His earliest achievement was a successful war against the Bohemian Duke Boleslas, whom he reduced

to subjection, and forcibly converted to Christianity; next the Dukes of Bavaria and Franconia were compelled to succumb to his power; the former paying the penalty of his opposition to O. by defeat and death in battle, and the latter by the confiscation of his territories, which, together with the other laicised and recovered fiefs of the empire, were bestowed on near and devoted relatives of the conqueror. After subduing the Slavi of the Oder and Spree, for whose Christian regeneration he founded the bishoprics of Havelburg and Brandenburg, driving the Danes beyond the Eyder, compelling their defeated king to return to the Christian faith and do homage to himself; and after founding, at the suggestion of his mother's former chaplain, Adeldag, the bishoprics of Aarhus, Ribe, and Sleevig, which he decreed were for ever to be free from all burdens and imposts, he turned his attention to the affairs of Italy. Here he presented himself as the champion of the beautiful Adelheid, the widow of the murdered King Lothaire; and having defeated her importunate suitor, Berengar II. (q. v.), married her, and assumed supreme power over the north of Italy in 951. The wars to which this measure gave rise, obliged O. frequently to cross the Alps; but at length, after a great victory gained over the Huns in 955, and the defeat and capture of Berengar, O. was acknowledged king of Italy by a diet held at Milan; and after being crowned with the iron crown of Lombardy, was, in 962, recognised by Pope John XII. as the successor of Charlemagne, and crowned Emperor of the West at Rome. O. lost no time in asserting his imperial prerogatives; and having called a council, effected the deposition of John, whose licentiousness had become a burden to Italy and a scandal to Christendom, and caused Leo VIII. to be elected in his place. Fresh wars were the result of this step. Popes and anti-popes distracted the peace of Rome; but through all these disorders O. maintained the supremacy which he claimed as Emperor of the West, in regard to the election of popes and the temporal concerns of the Roman territories. His later years were disturbed by domestic differences; for his elder son, Ludolph, and his son-in-law, Konrad of Lorraine, having risen in rebellion against him, through jealousy of his younger son and intended successor, Otho, the empire was distracted by civil war. Although the war terminated in the defeat of the rebels, and the recognition of young Otho as king of the Germans, and his coronation at Rome, in 967, as joint-emperor with his father, O.'s favorite scheme of uniting the richly-dowered Greek princess, Theophania, with the young prince, met with such contempt from the Greek emperor, that his outraged pride soon again plunged him into war. His incursions into Apulia and Calabria, however, proved convincing arguments in favor of the marriage, and Theophania became the wife of young Otho, with Calabria and Apulia for her dowry. O. died at Minsleben, in Thuringia, in 973, and was buried at Magdeburg, leaving the character of a great and just ruler, who had extended the limits of the empire, and restored the prestige of the imperial power more nearly to the stand which it occupied under Charlemagne than any other emperor. He created the duchy of Carinthia, and the markgraffdoms of East and North Saxony; appointed counts-palatine; founded cities and bishoprics; and did good service to the empire, in reorganising the shaken foundations of its power in Europe. See Vohs's "*Leben Kaiser O's des Grossen*" (Dressd. 1827).

OTHO II., surnamed *Rufus*, "the Red," son of Otho I., was born in 955, and succeeded his father in 973. For a time, O. was content to rule under the regency of his mother, the Empress Adelheid; but differences having arisen between them, through the headstrong and ambitious inclinations of the young monarch, his mother withdrew from all share in the administration, and left him to the exercise of his own will, which soon brought him into collision with the great vassals of the crown. Civil war broke out under the leadership of Henry II. of Bavaria, who formed a secret alliance against the young emperor with Harald, king of Denmark, and Mislav of Poland, and for a time fortune inclined to the side of the rebels; but O.'s astuteness circumvented their designs, and after defeating Henry and depriving him of his duchy, he marched against the Danish king, who had been making successful incursions into Saxony. O.'s first attack on the Dannevirke having proved of no avail, he retired, vowing that he would return before another year and force every Dane to forewear paganism. O. kept his promise, returning to the attack the following year, when, according to the old chroniclers, acting by the advice of his ally, Olaf Trygvesson of Norway, he caused large quantities of trees, brushwood

and stable to be piled up against the Dannevirke and set on fire, and this drove away the defenders and destroyed their fortifications. The defeated Harold was soon overpowered by the superior numbers of the Germans, and compelled to receive baptism, as the badge of his defeat. The next scene of war was Lorraine, which the French king, Lothaire, had seized as a former appanage of his crown; but here, after a partial defeat, O. succeeded in reasserting his power; and not content with this advantage, devastated Champagne, pursued and captured Lothaire, and advanced upon Paris, one of the suburbs of which he burned. Scarcely was this war ended, when the disturbed condition of Italy called O. across the Alps. His presence put a stop to the insurrection at Milan and Rome, where he re-established order; and having advanced into Lower Italy, he defeated the Saracens, drove back the Greeks, and having re-established his supremacy in Apulia and Calabria, which he claimed in right of his wife, Theophania, made himself master of Naples and Salerno, and finally of Tarentum, in 982. The Greek emperor, alarmed at the successful ambition of O., called the Saracens again into Italy, who gave him battle with overwhelming numbers. The result was the total defeat of the emperor, who only escaped from the hands of the victors by plunging with his horse into the sea, and swimming, at the risk of his life, to a ship. Unluckily, it was a Greek ship, and O. was virtually a prisoner; but as the vessel neared Rossano, a friendly port, he contrived to escape by a cunning stratagem. O. now hastened to Verona, where a diet was held, which was numerously attended by the princes of Germany and Italy, and at which his infant son, Otho, was recognised as his successor. This diet is chiefly memorable for the confirmation by O. of the franchises and privileges of the republic of Venice, and the enactment of many new laws, which were added to the celebrated Longobard code. O.'s death at Rome, at the close of the same year, 983, arrested the execution of the vast preparations against the Greeks and Saracens, which had been planned at the diet of Verona, and left the empire embroiled in wars and internal disturbances. See Giesebrecht's "*Jahrbücher des Deutschen Reichs unter der Herrschaft, Kaiser O.'s II.*" (Berl. 1840).

OTHO III., who was only three years old at his father's death, was at once crowned king of the Germans at Aix-la-Chapelle in 983, from which period till 996, when he received the imperial crown at Rome, the government was administered with extraordinary skill and discretion by three female relatives of the boy-king—viz., his mother, Theophania; his grandmother, Adelheid; and his aunt, Matilda, Abbess of Quedlinburg, who, in conjunction with the learned Willegis, Archbishop of Mainz, directed his education. The princes of the imperial family disputed the right of these royal ladies to the custody of the young king; and Henry of Bavaria, the nearest agnate, having seized the person of O., tried to usurp the supreme power; but opposed by the majority of the other princes of the empire, he was compelled to release him, in consideration of receiving back his forfeited duchy. O. early shewed that he had inherited the great qualities of his forefathers, and when scarcely fifteen years of age, at the head of his army, defeated the troops of the patrician Crescentius, the self-styled consul of Rome, and thus restored order in the Roman territories. In 996, he was crowned emperor by his relative, Gregory V.; and having settled the affairs of Italy, returned to Germany, where he defeated the Slaves, who had long carried on war against the empire; and having forced Mieslav, Duke of Poland, to do him homage, he subsequently raised the Polish territories to the rank of a kingdom, in favor of Mieslav's successor, Boleslas. The renewed rebellion of Crescentius, who drove Gregory from the papal throne, compelled O. to return to Italy, where success, as usual, attended his measures. Crescentius, who had thrown himself into St Angelo, was seized and beheaded, together with twelve of his chief adherents; the anti-pope, John XVI., imprisoned; Gregory restored; and on the speedy death of the latter, O.'s old tutor, Gherbert, Archbishop of Ravenna, raised to the papacy under the title of Sylvester II. O., elated with his success, took up his residence in Rome, where he organised the government, erected new buildings, and shewed every disposition, notwithstanding the ill-concealed dissatisfaction of the Romans, to convert their city into the capital of the western empire. The near approach of the year 1000, to which so many alarming prophecies were then believed to point as the end of the world, induced O. to undertake a pilgrimage to the Holy Land, where he founded an archbishopric. On his return, after visiting Charlemagne's grave at Aix-la-Chapelle,

and removing the consecrated cross, suspended from the emperor's neck, he again repaired to Rome, to consolidate his schemes of establishing a Roman empire. The insurrection of the Romans frustrated his plans, and escaping from Rome at the risk of his life, he withdrew to Ravenna, to await the arrival of powerful reinforcements from Germany; but before they had crossed the Alps, O. died in 1003, at the age of 22, apparently from poison, which was said to have been administered to him by the widow of Crescentius, who, it is said, had deliberately set herself to win his affections that she might have an opportunity of avenging the death of her husband; and with him the male branch of the Saxon Imperial House became extinct. See Willman's "*Jahrbücher des Deutschen Reichs unter Kaiser Otto III.*" (Berl. 1840).

OTHO I., second son of Ludwig, king of Bavaria, was born at Salzburg, 1st June 1815, and on the erection of Greece into a kingdom in 1832, was appointed by the protecting powers king of Greece. Till he attained his majority, the government was intrusted to a regency, which was unable to suppress internal disorder, or counteract the diplomatic intrigues of foreign powers. On assuming the government in 1835, O. transferred the court from Nauplia to Athens, and passed into law several important measures, which afforded the most lively satisfaction to his subjects. During a visit to Germany in 1836, he married the Princess Amalie of Oldenburg. A monetary crisis, provoked partly by false administrative measures, and partly by too prompt demands for repayment on the part of the protecting powers, threw the affairs of Greece into confusion, and materially weakened the king's popularity. A national reaction against the Germanising tendencies of the court followed, and resulted in 1843 in a military revolution, which was suppressed. O. now attempted to soothe the general discontent by taking the oath to the new constitution of March 30, 1844, but his efforts were only partially successful. Though the Bavarian ministers were dismissed, the king and his Greek advisers shewed the most reactionary tendencies, and attempted in various ways to curtail the privileges which the new constitution had conferred on the people. The equivocal position in which he was placed, in 1853, between the allied powers on the one hand, and his subjects, whose sympathies were strongly in favor of Russia, on the other, greatly increased the difficulties of his situation. The occupation of the Piræus by Anglo-French troops enabled him to restrain the enthusiasm of his subjects; but after their withdrawal in 1857, he was obliged to adopt severe measures against the frontier brigands. His council, too, was composed of men unable or unwilling to support him, and his position became year by year more and more difficult. The strong pro-Russianism of the queen rendered her for some time a favorite; but the belief that O.'s absolute measures were due to her instigation, turned the tide of popular hatred so strongly against her, that attempts were made on her life. The general discontent at last found vent in insurrections at Nauplia and Syra in 1863, which were soon suppressed. A more formidable insurrection in the districts of Missolonghi, Acarnania, Elis, and Messenia, having for its object the expulsion of the reigning dynasty, broke out in October of the same year, and in a few days extended to the whole of Greece. O. and his queen fled to Salamis, from which place he issued a proclamation declaring that he quitted Greece to avoid the effusion of blood, and a provisional government was then established. This government, in February 1863, resigned its executive power to the National Assembly, which confirmed its acts, and decreed that Prince Alfred of England had been duly elected king of Greece. On the refusal of this prince to accept the throne, their choice fell on Prince William of Sleswig-Holstein-Sonderburg-Glücksburg, the second son of Christian IX., king of Denmark, who, under the title of George I., King of the Hellenes, in September 1863, assumed the functions of royalty. O. died July 26, 1867.

OTITIS, or inflammation of the tympanic cavity of the ear, may be either acute or chronic, and it may come on during the course of certain febrile affections, especially scarlatina, or in consequence of a scrofulous, rheumatic, or gonic constitution; or it may be excited by direct causes, as exposure to currents of cold air, violent syringing or probing, &c. The symptoms of the acute form are sudden and intense pain in the ear, increased by coughing, sneezing, or swallowing, *tininnitus aurium*, or ringing or buzzing noises heard by the patient, and more or less deafness. If the disease goes on unchecked, suppuration takes place, and the membrane of the tympanum ulcerates, and allows of the discharge of pus, or inflammation of the dura mater and abscesses in the brain may be established. In less severe cases

there is usually a considerable amount of persistent damage, and an obstinate discharge of matter (*otorrhœa*) is a frequent sequence of the disease.

The treatment of so serious an affection must be left solely in the hands of the medical practitioner.

The symptoms of the chronic and less acute varieties of otitis are unfortunately so slight, that they are often neglected, until the patient finds the sense of hearing in one or both ears almost completely gone. In these milder forms of otitis, the general indications of treatment are to combat the diathesis on which they frequently depend, and to improve the general health. Very small doses of mercury continued for a considerable time (such as one grain of gray powder night and morning), and small blisters occasionally applied to the nape of the neck or to the mastoid process, are often of service in very chronic cases. If there is any discharge, the ear should be gently syringed once or twice a day with warm water, after which a tepid solution of sulphate of zinc (one grain to an ounce of water) may be dropped into the meatus, and allowed to remain there two or three minutes.

O'TLEY, a small market town of England, in the West Riding of Yorkshire, on the right bank of the Wharfe, 29 miles west-south-west of York. Its parish church was built in 1507. Extensive cattle and grain markets are held here. Worsteds spinning and weaving, machine-making, and the manufacture of malt, bricks, and leather, are the main occupations. Pop. (1871) 5856.

OTO'LITHUS, a genus of fishes of the family *Scienidae* (q. v.), having a perch-like form, a convex head, with cellular bones, feeble anal spines, no barbels, long curved teeth or canines among the other teeth. A valuable species of this genus is the WEAK-FISH, or SQUETEAGUE (*O. regalis*), which is common on the eastern coasts of North America, from the Gulf of Mexico to the Gulf of St Lawrence, and attains a length of two feet. It appears on the coasts only in the warmer part of the year. It swims in shoals near the surface, takes bait greedily, and may be readily taken by any soft bait. It enters the mouths of rivers where the water is brackish. The flesh is pleasant, but soon gets soft. Excellent isinglass is made of the air-bladder. —A number of species of *O.* are found in the East Indian seas, some of which are valuable for the isinglass which is made from their air-bladder, and some are much used as food, both fresh and dried.

OTORRHŒA signifies a purulent or muco-purulent discharge from the external ear. It may be due to various causes, of which the most frequent is catarrhal inflammation of the lining membrane of the meatus, and the next in frequency is Otitis (q. v.) in its various forms. If the discharge is very fetid, a weak solution of chloride of lime, or of Condy's Disinfectant Fluid, may be used, in place of the solution of sulphate of zinc recommended in article OTITIS; and in obstinate cases of catarrhal inflammation of the lining membrane, the discharge may often be checked by pencilling the whole interior of the meatus with a solution of five grains of nitrate of silver in an ounce of water.

OTRA'NTO, Terra di, now called LECCE, the extreme south-eastern province of Italy, forming the heel of the Italian boot, is bounded on the n. w. by the provinces of Bari and Basilicata, and surrounded on all other sides by the sea. Area, 8298 sq. m.; pop. (1871) 493,363. It occupies the ancient Iapygian or Messapian peninsula, and is 102 miles in length, and from 25 to 35 miles in breadth. Three parts of its surface are covered with hills, offsets from the Apennines of Basilicata. All the rivers are short, many of them being lost in the marshes of the interior; but abundant springs and heavy dews render the soil surprisingly fertile. Good pastures and dense forests occur. The climate is pleasant and healthy, except along the shores, both on the east and west coasts, and in the vicinity of the marshes, which in summer generate malaria. An abundance of the best wine, with corn and olive-oil, are produced; tobacco (the best grown in Italy), cotton, and figs, almonds, oranges, &c., are also produced. The capital is Lecce (q. v.).

OTRANTO (the ancient *Hydruntum*), a small town on the south-east coast of the province of the same name, 24 miles south-east of Lecce. During the latter period of the Roman empire, and all through the middle ages, it was the chief port of Italy on the Adriatic, whence passengers took ship for Greece—having in this respect supplanted the famous Brundisium of earlier times. In 1480 it was taken by the Turks, and at that time it was a flourishing city of 20,000 inhabitants; but it has long been in a decaying condition, principally on account of malaria. *O.* possesses



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a castle and a cathedral. Its harbor is unsafe. In clear weather, the coast of Albania is visible from Otranto. Pop. about 9000.

**OTTAWA**, one of the largest rivers of British North America, rises in lat. 48° 30' n., long. 76° w., in the watershed on the opposite side of which rise the St. Maurice and Saguenay. After a course of above 600 miles, it falls into the St. Lawrence by two mouths, which form the island of Montreal; and the entire region, drained by it and its tributaries, measures about 80,000 square miles ("Geol. Rep." for 1845-1846, p. 13). During its course, it widens into numerous lakes of considerable size, and is fed by many important tributaries, such as the Mattawa, Mississipi, Madawasca, and Rideau on the right, the Gatineau and the Rivières du Moine and du Lièvre on the left side. These, with the O. itself, form the means of transit for perhaps the largest lumber trade in the world, while the clearances of the lumberer have opened the country for several thriving agricultural settlements. The navigation has been greatly improved, especially for timber, by the construction of dams and slides, to facilitate its passage over falls and rapids. The O. is already connected with Lake Ontario at Kingston by the Rideau Canal; and there is every prospect of its becoming, before many years, the great highway from the north-western states to the ocean by being connected with the Georgian Bay in Lake Huron through the French River, Lake Nipissing, and the Mattawa. This great engineering achievement, for which capital will undoubtedly be soon forthcoming, would place the western lake ports by water 760 miles nearer to Liverpool by Montreal than by New York through the Erie Canal, and would save nearly a week in time, while it would lessen considerably insurance and freight charges.—The O. possesses one of the few literary associations of Canada. At St. Ann's, a few miles above its mouth, the house is pointed out where Moore, wrote the Canadian Boat-song.

**OTTAWA**, the capital of the Dominion of Canada, is situated 87 miles above the confluence of the river Ottawa with the St. Lawrence, 126 miles from Montreal, 95 from Kingston, and 450 from New York. Originally called Bytown, after Colonel By, who in 1827 was commissioned to construct the Rideau Canal, it was incorporated as a city, and received the name which it now bears in 1854. At the west end of the city, the Ottawa rushes over the magnificent cataract known as the Chaudière Falls, and at the north-east end there are other two cataracts, over which the Rideau tumbles into the Ottawa. The scenery around O. also is scarcely surpassed by any in Canada. The immense water-power at the city is made use of in several saw-mills, which give O. its principal trade, and issue almost incalculable quantities of sawn timber. A suspension-bridge hangs over the Chaudière Falls, connecting Upper and Lower Canada. The city is in communication by steamer on the Ottawa with Montreal; on the Rideau Canal with Lake Ontario at Kingston; and with the principal points of the province by means of the St. Lawrence and Ottawa and the Canada Central lines. In the year ending June 30, 1874, the imports amounted to £300,000, and the exports to £336,000. In 1858, the Queen selected O. as the seat of government of the then province of Canada; and in 1860 was commenced the erection of magnificent parliamentary offices, of which the Prince of Wales laid the foundation in September the same year. They are among the finest architectural structures on the American continent. Pop. (1871) 21,545. O. returns two members to the House of Commons, and one to the provincial parliament.

**OTTER** (*Lutra*), a genus of quadrupeds of the Weasel family (*Mustelidae*), differing widely from the rest of the family in their aquatic habits, and in a conformation adapted to these habits, and in some respects approaching to that of seals. The body, which is long and flexible, as in the other *Mustelidae*, is considerably flattened; the head is broad and flat; the eyes are small, and furnished with a *nictitating membrane*; the ears are very small; the legs are short and powerful; the feet, which have each five toes, are completely webbed; the claws are not retractile; the tail is stout and muscular at its base, long, tapering, and horizontally flattened; the dentition is very similar to that of weasels; six incisors and two canine teeth in each jaw, with five molars on each side in the upper, and five or six in the lower jaw; the teeth very strong, and the tubercles of the molars very pointed, an evident adaptation for seizing and holding slippery prey. The tongue is rough, but not so much so as in the weasels. The fur is very smooth, and consists of two kinds of hair—an

inner fur very dense and soft, intermixed with longer, coarser, and glossy hair. The species are numerous, and are found both in warm and cold climates.—The COMMON O. (*L. vulgaris*) is a well-known British animal, rarer than it once was in most districts, but still found in almost every part of the British Islands, and common also throughout the continent of Europe, and in some parts of Asia. It often attains a weight of 20 to 24 lbs. Its length is fully 2 feet, exclusive of the tail, which is about 18 inches long. The color is a bright rich brown on the upper parts and the outside of the legs, being the color of the tips of the long hairs, which are gray at the base; the tips of the hairs in the soft inner fur are also brown, the base whitish-gray; the throat, cheeks, breast, belly, and inner parts of the legs are brownish-gray, sometimes whitish, and individuals sometimes, but rarely, occur with whitish spots over the whole body; the whiskers are very thick and strong; the eyes are black. The O. frequents rivers and lakes, inhabiting some hole in their banks, generally choosing one which already exists, and seldom, if ever, burrowing for itself. It also inhabits the sea-shore in many places, and swims to a considerable distance from the shore in pursuit of prey. Its movements in the water are extremely graceful; it swims with great rapidity in a nearly horizontal position; and turns and dives with wonderful agility. Its prey consists chiefly of fish, and, like the other *Mustelidae*, it seems to take pleasure in pursuing and killing far more than it is able to eat; and in this case it daintily feeds on the choicest part, beginning behind the head of the fish, and leaving the head and often much of the tail part. The O., however, when fish cannot readily be obtained, satisfies the cravings of hunger with other food, even snails and worms, and attacks small animals of any kind, sometimes making depredations in places far from any considerable stream. The O. produces from two to five young ones at a birth. The flesh of the O. has a rank fishy taste, on which account, perhaps, it is sometimes used in the Roman Catholic Church, as *fish*, by those whose rules forbid them the use of flesh.—O. hunting has long been practiced in Britain, although now chiefly confined to Wales and Scotland. Hounds of a particular breed—O. hounds are preferred for it.—The O. defends itself with great vigor against assailants. The O. can be easily domesticated, and trained to catch fish for its master. In India, tame otters—probably, however, of another species to be afterwards noticed—are not unfrequently used both for catching fish, which they bring ashore in their teeth, and for driving shoals of fish into nets.—The fur of the O. is in some request, but more on the continent of Europe than in Britain.—The AMERICAN O. or CANADA O. (*L. Canadensis*) is very like the Common O., but considerably larger. The tail is also shorter, and the fur of the belly is almost of the same shining brown color with that of the back. This species is plentiful in the northern parts of North America. Its skin is a considerable article of commerce, and after being imported into England, is often exported again to the continent of Europe. It is usually taken by a steel-trap, placed at the mouth of its burrow. Its habits are very similar to those of the O. of Europe.—The INDIAN O. (*L. Nair*) has a deep chestnut-colored fur, and yellowish-white spots above the eyes.—The Brazilian O. (*L. Brazilianensis*) is said to be gregarious.—Somewhat different from the true otters is the SEA O. or KALAN (*L. marina*, or *Enhydra utis*), an animal twice the size of the Common O., a native of Behring's Straits and the neighboring regions, frequenting sea-washed rocks. There are, at least in the adult, only four incisors in the lower jaw, and the ears are set lower in the head than in the true otters, below, not above, the eyes. The tail is also much shorter. The molar teeth are broad, and well adapted for breaking the shells of molluscs and crustaceans. The hind-feet have a membrane skirting the outside of the exterior toes. The sea O. is much valued for its fur, the general hue of which is a rich black, tinged with brown above, and passing into lighter colors below. The head is sometimes almost white. The skins of sea otters were formerly in very great request in China, so that a price of from £35 to £50 could be obtained for each; but the attention of European traders and hunters having been directed to them—in consequence chiefly of a passage in "Cook's Voyages"—they were carried to China in such numbers as greatly to reduce the price.

OTTTERBURN, Battle of. See CHEVY CHASE.

OTTQ (or attar) OF ROSES is the volatile oil or otto (see PERFUMERY) of the petals of some species of rose, obtained by distillation, and highly prized as a per-

fume. It is a nearly colorless or light yellow crystalline solid, at temperatures below 80° F., liquefying a little above that temperature. It is imported from the East, where in Syria, Persia, India, and Turkey, roses are cultivated to a considerable extent for its sake. It is probable that the oriental otto is the produce of more than one species of rose; and it is uncertain what species is cultivated in some of the localities most celebrated for it; but *Rosa Damascena* is known to be so employed in the north of India, and a kind of otto is sometimes obtained by the makers of rose-water from *Rosa centifolia* in England. See ROSE. Ghazipore, near Benares, is celebrated for its rose-gardens, which surround the town, and are in reality fields occupied by rows of low rose-bushes, which in the flowering season are red with blossoms in the morning, but the blossoms are all gathered before midday. Cashmere is noted for its extensive manufacture of otto, as are also the neighborhoods of Shiraz and Damascus. To procure the otto, the rose petals are usually distilled with about twice their weight of water, and the produce exposed to the cool night-air in open vessels, from which the thin film of otto is skimmed with a feather in the morning. Twenty thousand flowers are required to yield otto equal to the weight of one rupee, which even in India is worth about 100 rupees, or £10 sterling. Otto is said to have been first procured by what may be called an accidental distillation of rose-petals exposed with water to the heat of the sun, and to have been found floating on the surface of the water; and it is still sometimes obtained in India by such a process. It is said to be also obtained by dry distillation of rose-petals at a low temperature. During the distillation of rose-petals a small quantity of a solid volatile oil comes over (Solid Oil of Roses, see below), which crystallises and floats on the water in the receiver, and which is sometimes called *English Oil of Roses*. Otto of roses is not unfrequently adulterated with sandalwood oil, oil of rhodium, &c. It is much used for making hair-oil, a drop of it being enough to impart a pleasant odor to a considerable quantity. It is also used in making lavender-water and other perfumes. The odor of otto itself is too powerful to be altogether pleasant. Another method of obtaining the scent of roses is described in the article PERFUMERY. Otto of roses is a mixture of two volatile or essential oils; the one solid at ordinary temperatures, and the other liquid. The solid oil of roses (rose camphor, stéaroptène of oil of roses) exists separately in crystalline plates, melts or fuses at 90° F., and boils at about 599°. It possesses of itself very little odor, is insoluble in alcohol, but soluble in ether. It is composed of carbon and hydrogen. The liquid oil of roses (éleoptène of oil of roses) is a very fragrant liquid, to which the otto of roses is indebted for its delicious perfume, and appears to consist of carbon, hydrogen, and oxygen; though its composition and properties have not been attentively studied. The otto of roses may be regarded as a solution of one part of the solid oil in two parts of the liquid. To separate these oils, the otto is frozen at a temperature below 80° F., and the congealed mass pressed between folds of blotting-paper, which absorbs the liquid oil of roses, and leaves the solid. Another process which may be resorted to is to treat the frozen otto with alcohol, which dissolves the liquid oil, and leaves behind the solid. The otto of roses has a specific gravity of 833, water being 1000; it is combustible; and when its vapor is diffused through oxygen, and set fire to, a violent explosion takes place: 1000 parts of alcohol dissolve 7 parts of the otto in the cold, and 33 parts when slightly heated. The principal use to which otto of roses is put is as a perfume. Milk of roses and lavender-water owe their fragrance to the presence of the otto. A good receipt for oil for the hair is olive oil, colored by alkanet, and scented by a few drops of otto, and this is very generally sold under the name of otto of roses. Medicines are occasionally perfumed by otto of roses, and it is sometimes added to nungents and spirit-washes.

OTTOMAN EMPIRE, or "Empire of the Osmanlis," comprehends all the countries which are more or less under the authority of the Turkish sultan, and includes, besides Turkey in Asia, and that part of Turkey in Europe which is under his immediate sovereignty, the vassal principalities of Moldavia and Wallachia (i.e. Roumania), Servia, and Montenegro, in Europe; Egypt with Nubia, Tripoli, and Tunis, in Africa; and a part of Arabia, including the holy cities of Mecca and Medina, in Asia. The special description, topography, history, &c., of these countries will be found under their own heads, and this article will consist solely of a brief sketch of the origin, growth, and present state of the Ottoman Empire.

The Ottomans, or Osmanlis, to whom the generic epithet of *Turks* is by common usage now confined, are the descendants of the Oğuzian Turks, a tribe of the great Turkish nation, which in the 13th c. inhabited the steppes east of the Caspian Sea. The tide of Mongol invasion which was then settling in from the north-east, swept the Oğuzes before it, and they, to the number of 50,000, under their chief, Suluiman, fled westward to the mountainous region of Armenia. After the chief's death, the majority of the tribe became scattered over Mesopotamia; but a few thousands under Orthoguel, his youngest son, marched westward to aid the Seljuk sultan of Kouieh against the Khaurezmians and Mongols, and received from the grateful monarch a grant of land in Phrygia.—His son, OTTHMAN (q. v.) (1289—1326), laid the foundation of the independent power of the Turks; and Othman's son and successor, ORKHAN (1326—1359) continued the same aggressive policy, and gained a footing in Europe by the taking of Gallipoli, Koldicastron, and other fortresses on the coast. The Greeks, with the usual contempt of civilisation for barbarism, made light of these losses, saying that the Turks had only taken from them a "hog's sty" and a "pottle of wine," in allusion to the magazines and cellars built by Justinian at Gallipoli; but, as the historian Kuolles quaintly remarks, "by taking of such hogsties and pottles of wine, the Turks had gone so far into Thracia, that Amurath, a few years later, placed his royal seat at Adrianople." Sultan Orkhan, perceiving the advantage of possessing a force trained exclusively for war, organised the body of troops known as Janizaries (q. v.), and to these his successor added the Spahis (q. v.) and the Zanis.—AMURATH I. (1359—1390), the successor of Orkhan, rapidly reduced the Byzantine empire within the limits of Constantinople and some neighboring districts in Thrace and Bulgaria. A formidable confederacy of the Slavonian tribes of the Upper Danube was formed against him, and, supported by multitudes of warriors from Hungary and Italy, they advanced into Serbia to give him battle; but their army, amounting, it is said, to 500,000 men, was defeated with dreadful slaughter at Kossova (1390); and though the sultan was assassinated on the eve of the battle, his son, BAJAZET I. (q. v.) (1390—1402), followed up this victory by ravaging Serbia and Walachia. Moldavia was also overrun, and a second crusading army, under the king of Hungary, totally routed at Nicopolis (1396); but the defeat and capture of the sultan by Timur (q. v.), gave Constantinople a respite for half a century, by raising up numerous claimants for the Turkish throne; and it was not till 1413 that Bajazet's youngest son, MOHAMMED I. (1413—1422), established his claim to the sceptre. A war which broke out with the Venetian republic at this time produced the most disastrous consequences to the mercantile and maritime interests of the Turks, and internal disorders prevented any aggressions on their neighbors.—AMURATH II. (1422—1450), a prince of considerable ability, completed the conquest of the Greek empire by reducing Macedonia and Greece Proper; and finding that the Hungarians had concluded a secret treaty of offence and defence with the Turkish sultan of Caramania against him, he attacked the former, but was defeated by Hunyady (q. v.), and compelled to retreat. Disheartened at his ill success, he resigned the throne; but on receiving news of a formidable invasion by the army of the papal crusade, resumed the direction of affairs, and totally defeated the invaders, with whom were Hunyady (q. v.) and Scanderbeg (q. v.), at Varna (1444).—MOHAMMED II. (q. v.) (1450—1451), the sworn foe of Christianity, greatly enlarged the Turkish territories. It was he who stormed Constantinople in 1453, and destroyed the last relic of the empire of the Cæsars.—His son, BAJAZET II. (1481—1512), extended his dominions to the present limits of the Turkish empire in Asia and Europe, including, however, also the country to the north of the Black Sea, as far east as the mouth of the Don, portions of Dalmatia, and Otranto in Italy. Bajazet was the first to feel the evil effects of the military organisation of Sultan Orkhan, but all his attempts to get rid of his formidable soldiery were unsuccessful. He attempted the invasion of Egypt, but was totally defeated by the Mameluke sultan at Arbelo (1493).—His successor, SELIM I. (q. v.) (1512—1520), and SOLYMAN I. (q. v.), (1520—1566), raised the O. E. to the height of its power and splendor. During their reigns, no ship belonging to a nation hostile to the Turks dared then navigate the Mediterranean, so completely did their fleets command that sea.—SELIM II. (1566—1574), a pacific prince, put an end to a war with Austria, which had been commenced in the previous reign, by a peace in which it was stipulated that the Emperor Maximilian II.

should pay a tribute of 80,000 ducats annually for the possession of Hungary, and that each nation should retain its conquests. During his reign occurred the first collision of the Turks with the Russians. It had occurred to Selim that the connection of the Don and Volga by a canal would, by allowing the passage of ships from the Black Sea into the Caspian, be a valuable aid to both military and commercial enterprise, and accordingly he sent 5000 workmen to cut the canal, and an army of 80,000 men to aid and protect them. But, unluckily, the possession of Astrakhan formed part of the programme, and the attack of this town brought down on the Turks the vengeance of the Russians, a people till then unknown in Southern Europe, and the projected canal-scheme was nipped in the bud. The rest of this sultan's reign was occupied in petty wars with Venice, Spain, and his rebellious feudatory of Moldavia.—His son, AMURATH III. (1574—1595), such was then the prestige of the Turks, dictated to the Poles that they should choose as their king, Stephen Bathory, Woiwode of Transylvania; and received the first English embassy to Turkey in 1583, the object of the embassy being to conclude an alliance against Philip II. of Spain. To this the sultan agreed; but the destruction of the Spanish Armada soon after rendered his interference unnecessary. After an exhausting though successful war with Persia, succeeded a long contest with Austria, in which the Turks at first obtained the most brilliant success, penetrating to within 40 miles of Vienna, but afterwards suffered such terrible reverses, that they were compelled to evacuate all Hungary and Transylvania (hitherto a feudatory), and were only saved from destruction by the Poles, who entered Moldavia, and drove out the Transylvanians and Hungarians, thus affording the Turks an opportunity of rallying, and even recovering some of their losses. The latter part of this war happened during the reign of MOHAMMED III. (1595—1604), and afforded unmistakable symptoms of the decline of Turkish prowess; and a rebellion of the Pasha of Caramania, in Asia, which was quelled not as a Mohammed II. or a Bajazet I. would have quelled it, but by yielding to the pasha's demands, afforded an equally convincing proof of the growing weakness of the central administration, and set an example to all ambitious subjects in future. During the reigns of ACHMET I. (1604—1617), MUSTAFA (1617—1619, 1622—1623), OTHMAN II. (1617—1622), and AMURATH IV. (1623—1640), Turkey was convulsed by internal dissensions, nevertheless, a successful war was waged with Austria for the possession of Hungary; but this success was more than counterbalanced in the East, where Shah Abbas the Great conquered Mesopotamia, Kurdistan, and Armenia; and in the north, where the Poles took possession of some of the frontier fortresses. While Amurath was recovering his lost provinces in the East, the Khan of the Crimea, countenanced by the Poles and Russians, threw off his allegiance. Mustafa, the grand vizier, a man of great ability and integrity, continued to direct the helm of government under IBRAHIM (1640—1648); took from the Poles their conquests; and in a war with the Venetians (1645), obtained Candia and almost all the Venetian strongholds in the Ægean Sea, though with the loss of some towns in Dalmatia.—MOHAMMED IV. (1648—1687) commenced his reign under the most unfavorable auspices; he was only seven years of age, and the whole power was vested in the Janizaries and their partisans, who used it to accomplish their own ends; but luckily for Turkey, an individual of obscure birth, named Mohammed Köprili, supposed to be of French descent, was, when over seventy years of age, appointed vizier; and the extraordinary talents of this man proved to be the salvation of Turkey at this critical juncture. He was succeeded (1661) in office by his son Achmet, a man of equal ability, and under his guidance the central administration recovered its control over even the most distant provinces; a formidable war with Germany, though unsuccessfully carried on (1663), was concluded by a peace advantageous to the Turks; Crete was wholly subdued, and Podolia wrested from the Poles; though, shortly afterwards, much of this last acquisition was reconquered by John Sobieski (q. v.). Achmet's successor overran the Austrian territories, and laid siege to Vienna; but the siege was raised, and his army defeated, by a combined army under the Duke Charles of Lorraine, and John Sobieski, king of Poland. The Austrians followed up this victory by repossessing themselves of Hungary, inflicting upon the Turks a bloody defeat at Mohacz (1687); but the fortunate appointment of a third Köprili as grand vizier by SOLYMAN II. (1687—1691), was the means of restoring glory and fortune to the Turkish arms.—The reigns of ACHMET II. (1691—1695),

and **MUSTAFA II.** (1695—1702), were occupied with wars against Austria; but with the death of Köprülü (1691) fortune deserted the Turks, and the peace of Carlowitz (1699) for ever put an end to Turkish domination in Hungary.—**ACHMET III.** (1702—1730) was forced by the intrigues of Charles XII. (q. v.) of Sweden, while residing at Bender, into a war with Russia; a step which was immediately followed by an invasion of Moldavia by the Czar Peter. The Czar, imprudently relying on the aid of the Voivode of Moldavia, found himself in great straits, from which he was rescued by the genius of his queen, afterwards Catharine I. The recovery of the Morea from the Venetians, and the loss of Belgrade and parts of Servia and Wallachia, which were, however, recovered during the subsequent reign of **MAHMUD I.** (1730—1754); and the commencement of a long war with Persia (see **NADIR SHAH**), were the other prominent occurrences of Achmet's reign. In 1736, the career of Russian aggression commenced with the seizing of Azof, Oczakof, and other important fortresses; but a scheme for the partition of Turkey between Austria and Russia was foiled by the continued series of disgraceful defeats inflicted upon the Austrian armies by the Turks; the Russians, on the other hand, were uniformly successful; but the Czarina becoming very desirous of peace, resigned her conquests in Moldavia, and concluded a treaty at Belgrade. Among the benefits conferred by Sultan Mahmud on his subjects, not the least was the introduction of the art of printing.—His successor, **OTTMAN III.** (1754—1757), soon gave place to **MUSTAFA III.** (1757—1774), under whom the empire enjoyed profound tranquillity; but after his death, the Russians, in violation of the treaty of Belgrade, invaded Moldavia.—The war with Russia continued during the succeeding reign of **ABDUL-HAMID** (1774—1789); the fortresses on the Danube fell; and the main army of the Turks was totally defeated at Shumla. The campaign was ended 10th July 1774, by the celebrated treaty of Kutschuk-Kainardji. In defiance of its provisions, the Czarina took possession of the Crimea, and the whole country eastward to the Caspian. The sultan was compelled, by his indignant subjects, to take up arms in 1787. In 1788, Austria made another foolish attempt to arrange with Russia a partition of Turkey; but, as before, the Austrian forces were completely routed. The Russians, however, with their usual success, had overrun the northern provinces, taken all the principal fortresses, and captured or destroyed the Turkish fleet.—The accession of **SELIM III.** (q. v.) (1789—1807) was inaugurated by renewed vigor in the prosecution of the war; but the Austrians had again joined the Russians. Belgrade surrendered to the Austrians, while the Russians took Bucharest, Bender, Akerman, and Ismail (see **SUVOROF**); but the critical aspect of affairs in Western Europe made it advisable for Russia to terminate the war, and a treaty of peace was accordingly signed at Jassy, 9th January 1792. By this treaty the provisions of that of Kainardji were confirmed; the Dniester was made the boundary-line, the cession of the Crimea and the Kuban was confirmed, and Belgrade was restored to the sultan. Numberless reforms were now projected for the better administration of the empire. The people were, however, hardly prepared for so many changes, and the sultan's projects cost him his throne and life. The occupation of Egypt by the French brought on a war between them and the Turks, in which the latter, by the aid of the British, were successful in regaining their lost territories. In revenge for the defeat of his Egyptian expedition, Napoleon contrived to entrap the sultan into a war with Russia and Britain, which was confined to a struggle in Egypt, in which the British were worsted.—After the ephemeral reign of **MUSTAFA IV.** (1807—1808), the able and energetic **MAHMUD II.** (q. v.) (1809—1839) ascended the throne; and though his dominions were curtailed by the loss of Greece, which established its independence, and of the country between the Dniester and the Pruth, which, by the treaty of Bucharest in 1812, was surrendered to Russia, the reformation he effected in all departments of the administration checked the decline of the O. E. Egypt, during his reign, attempted unsuccessfully to throw off the authority of the sultan (see **MEHMET ALI**, **IBRAHIM PASHA**).—His son, **ABDUL-MEDJID** (1839—1861), continued the reforms commenced in the previous reign; but the Czar, thinking that the dissolution of the O. E. was at hand, constantly tried to wring from the sultan some acknowledgment of a right of interference with the internal affairs of the country. It was an attempt of this sort to obtain the exclusive protectorate of the members of the Greek church in Turkey, that brought on the "Crimean War" of 1853—1855, in which the Turks were effectively supported by

England, France, and Sardinia. The treaty of Paris (1856) restored to Turkey the command of both sides of the lower Danube, excluded the Czar from his assumed protectorate over the Danubian principalities, and closed the Black Sea against all ships of war. The Porte, apparently adopted into the family of European nations, made proclamation of equal civil rights to all the races and creeds of the Turkish dominions. But a massacre of Christians in Lebanon and at Damascus provoked western intervention in 1860.—Abdul-Medjid, whose last years were disgraced by irrational profuseness of expenditure, was succeeded by his brother ABDUL-AZIZ in 1861. Meanwhile the nominally subject peoples of Moldavia and Wallachia ventured to unite themselves into the one state of Rumania; and in 1866, the Empire, becoming more and more enfeebled through its corrupt administration, had to look on while the Rumanians expelled their ruler, and, in the hope of securing western support, chose Prince Charles of Hohenzollern to be hereditary prince (*domnia*) of the united principalities. The rebellion of Crete in 1866 threatened a severe blow to the integrity of the empire, but was ultimately suppressed in 1868—in spite of active help from Greece. Serbia, already autonomous within her own frontiers, demanded the removal of the Turkish garrisons still maintained in certain Serbian fortresses; and in 1867 Turkey saw herself compelled to make this concession. In the same year the sultan distinguished the Vali of Egypt by granting to him the unique title of Khedive (q. v.). The vassal king drew down the wrath of his suzerain in 1870 by negotiating directly with foreign courts, and was compelled to give formal tokens of vassalage. But later concessions have made the Khedive virtually an independent sovereign. The Russian government took the opportunity of war between Germany and France to declare, in 1871, that it felt itself no longer bound by that provision of the Paris treaty which forbade Russia to have a fleet in the Black Sea; and a London conference sanctioned this stroke of Russian diplomacy. Between 1864 and 1871 the Turkish debt had increased by more than £116,000,000; and in 1875 the Porte was driven to partial repudiation of its debts. An insurrection in Herzegovina in the latter part of 1874 marked the beginning of a very eventful and critical period in the history of the O. E. The insurrection smouldered on through 1875 and part of 1876, and excited all the neighboring Slavonic peoples. A threatened revolt in Bulgaria in May 1875 was repressed with much bloodshed; and the merciless cruelty displayed by the Bashibazouks or Turkish irregulars alienated foreign sympathy from the government.—In May Abdul-Aziz was deposed; and his nephew MEHMET V., son of Abdul-Medjid, who succeeded him, was destined in turn to make way for his brother ABDUL-HAMID II. in August of the same year. In June Serbia declared war, and Montenegro followed her example. Before the end of the year the Serbians were utterly defeated, in spite of the help of many Russian volunteers; but the state of affairs in the Turkish provinces seemed to call for a conference of the great powers at Constantinople. The proposals then made for the better government of the Christian subjects of Turkey were rejected by the Turkish authorities, who had, during the conference, taken the extraordinary step of bestowing a parliamentary constitution on the O. E. Russia took upon herself to enforce on Turkey the suggestions of the conference, and on 24th April 1877 declared war. Both in Armenia and Bulgaria the opening of the campaign was favorable to Russian arms, but later the Turks rallied and seriously checked the hitherto triumphant progress of the invaders. Even after the Russian forces had been greatly augmented the Turks resisted energetically. Kars, besieged for several months, resisted till the middle of November; Erzeroum did not surrender until after the armistice had been concluded. Osman Pasha, who established himself in Plevna early in July, repelled with brilliant success repeated and determined assaults from a besieging army of Russians and Rumanians; and he had so strengthened the fortifications as to be able to hold out until the 10th December, when he surrendered. Desperate fighting in the Shipka Pass had failed to expel the Russians from their position in the Balkans; and within a month of the fall of Plevna, the Russians captured the whole Turkish army that was guarding the Shipka Pass, and then easily overran Roumelia. The victorious Muscovites occupied Adrianople in January 1878, on the last day of that month an armistice was concluded; and in March the "preliminary treaty" of San Stefano was signed. After grave diplomatic difficulties, owing chiefly to the apparent incompatibility of English and Russian interests, a Congress of the Powers met

at Berlin, and ultimately agreed to that solution of the "Eastern Question," discussed under the article **TURKEY**, which has so seriously affected the area and standing of the O. E.

**OTWAY**, Thomas, an English dramatist, was born March 3, 1651, at Trotton, near Medhurst, Sussex. He left Oxford without taking a degree, and went to London in search of fortune in 1671. He appeared on the stage, but made a signal failure; and next he applied himself to dramatic composition. In 1675, "*Alcibiades*," his first tragedy, was printed; and in the following year he produced "*Don Carlos*," a play which was extremely popular, and "got more money than any preceding modern tragedy." His first comedy, "*Friendship in Fashion*," appeared in 1678, and, being sufficiently immoral to please the taste of the age, met with general appreciation. In 1677 O. received a cornet's commission in a regiment, which, however, was disbanded in 1678, and O. resuming his former occupation, produced the tragedy of "*Caius Marius*" in 1680. In the same year "*The Orphan*" met with an extraordinary, and, in some respects, a deserved measure of success. In 1681, "*The Soldier of Fortune*," and in the following year, the finest of all his plays, "*Venice Preserved*," were produced. From this time till his death, the poet had much to endure from poverty and neglect. Debts accumulating upon him, he retired to an obscure public-house on Tower Hill, for the purpose of avoiding his creditors, and here, at the premature age of 34, he died, April 14, 1685. Although O. achieved a brilliant reputation during his lifetime, although he is described by Dryden as possessing a power of moving the passions which he himself did not possess, and later by Sir Walter Scott as being Shakespeare's equal, if not his superior, in depicting the power of affection; yet his plots are artificial, and his language is without fancy, melody, or polish.

**OUDE**, or **Audh**, a province of British India, separated on the north from Nepal by the lower ranges of the Himalaya, whence it gradually slopes to the Ganges, which forms its boundary on the south and south-west. Extreme length from north-west to south-east, 270 miles; breadth, 160; area, 23,993 square miles. Population (1869) 11,220,232, or 468 to the square mile. O. is one great plain, the slope of which from north-west to south-east indicates also the direction of the principal rivers. These are the Gumti, the Ghagra (Ghogra), and the Rapti, which swarm with alligators. The northern part, on the edge of the Himalaya, is not very well known. It forms a portion of the Terai, a vast unhealthy tract stretching along the borders of Nepal, and covered with impassable forests. The climate of O. is cool and pleasant from November to March; during the next four months it is hot and sultry, after which follows the long rainy season, but in general it is considered the healthiest along the whole valley of the Ganges. The soil is light, and except small nodules of chalk and oolite called *kankars*, there is hardly a loose stone to be seen. O. was formerly more copiously watered than it is now, the clearing of the jungles having greatly decreased the moisture of the land. The chief crops are wheat, barley, gram, masure, mustard, rice (of the finest quality), millet, maize, joar, bajra, various kinds of pulse and oil-seeds, sugar-cane, tobacco, indigo, hemp, and cotton. The manufacturing industry of O. is not important; soda, saltpetre, and salt are the only articles of which more is produced than is requisite for home-consumption. Gunpowder, and all kinds of military weapons, guns, swords, spears, shields, and bows of bamboo, or Lucknow steel, are, however, also made, besides some woollen goods, paper, &c. Bridges are few, if any, and the roads in general bad. The principal is the famous military road from Cawnpore to Lucknow, which runs in a north-easterly direction.

The people are of a decidedly warlike disposition. The bulk of the inhabitants are Hindus, though the dominant race for centuries has been Mohammedan. The Brahmans are the most numerous class, but there are 29 different Rajput tribes. It is these two classes that mainly supplied the famous (or infamous) sepoys of the Bengal army. The language spoken is Hindustani.

The most characteristic feature in the social economy of O. is its *village-system*, for a description of which see **INDIA**. The *ryots*, or cultivators of the soil, cling to the land which their fathers have tilled for ages, with extraordinary affection, and thoroughly believe that they have a right of property in it; and, in general, we believe they are *actually* the owners of their farms, but in many cases they have been



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dispossessed by a class of tax-gatherers (resembling the Roman *publicani*) called *talukdars*, who farmed from the Mogul, and afterwards from the king of O., the revenues of a collection of villages called a *talukah*, and by their extortions so impoverished the ryots, or peasant-proprietors, that the latter were often forced to execute deeds transferring their property to the talukdars. Many of the more spirited would not submit to become *tenants*, and taking to the jungles, waged war on the new occupants of their ancestral lands, until gradually they sank into *dacoits*, or professional robbers. The extortions of the talukdars continued till the annexation of the country in 1856, and the country suffered severely from the retaliatory raids of the dispossessed ryots. The East India Company reinstated the ryots in their property, where the talukdars could not shew undisputed possession for 18 years—a proceeding which gave great offence to the latter, who, in consequence, assumed a coldly hostile attitude to the British during the great mutiny of the following year.

The principal towns are Lucknow (q. v.), Fyzabad, Oude, or Ayodhya, Roy Bareilly, and Shahabad.

O. is believed, by Sanscrit scholars, to be the ancient *Kosala*, the oldest seat of civilisation in India. The country was conquered by a Mohammedan army in 1195, and made a province of the Mogul empire. In 1763, the vizier of O., Saifdar Jung, rebelled against his imperial master, Ahmed Shah, and forced the latter to make the governorship hereditary in his family. His son, Sujah-ud-Dowlah, became entirely independent, and founded a dynasty which ruled the country, generally in a most deplorable manner, until, in the interests of the wretched inhabitants, the East India Company was forced to adopt the extreme measure of annexation. February 1, 1856. The necessity for this high-handed but most beneficent act will be better understood if we read the statistics of crime in O. during the last years of its independence: one item will suffice—from 1848 to 1854, there were, on an average, no fewer than 73 villages burned and plundered every year, while murders, robberies, abductions, and extortions were everyday occurrences. A feeble king, a blackguard soldiery, and a lawless peasantry had brought about a most helpless and ruinous anarchy. When the mutiny of 1857 broke out, O. became one of the great centres of rebellion. Upon this, the confiscation of all the estates of the talukdars was proclaimed by Lord Canning; but when the country was subdued by force of British arms, the estates of all such as laid down their arms and swore fealty to the British government were restored. The forts of the petty chiefs, however, were dismantled, and the inhabitants disarmed. The province is now administered by a chief commissioner. The chief feature of the present condition of affairs in O. is the preservation in their integrity of the estates of the talukdars. The amount of government revenue paid by the talukdars is about £1,000,000.

OUDE, or Awadh, one of the principal towns of the province Oude (q. v.) stands amid ruins on a hilly site on the right bank of the Sarayu or Gogra River, 80 miles east of Lucknow. It is also called *Hanumangā'dhi*, on account of a temple erected there in honor of Hanumat (q. v.), the fabled monkey-ally of Rāma, an incarnation of the god Vish'nu. The name O. is a corruption of the Sanskrit *Ayodhya* (from *a*, not, and *yodhya*, conquerable, hence "the invincible" city); but the ancient city of that name was situated opposite the modern O., where its ruins may still be seen. Ayodhya was one of the oldest seats of civilisation in India; it was the residence of the solar dynasty, or one of the two oldest dynasties of India, deriving its descent from the sun, but it obtained special renown through Rāma, the son of Das'aratha, a king of that dynasty. Its great beauty and immense size are dwelt upon in several of the Purānas and modern poems, but more especially in the "*Rāmāyana*" (q. v.), the first and last books of which contain a description of it. According to some Purānas (q. v.), Ayodhya was one of the seven sacred cities, the living at which was supposed to free a man from all sin, and the dying at which, to secure eternal bliss. It was also called *Sāketa*, *Kos'ala*, and *Uttar-kos'ala*. See Goldstücker's "*Sanskrit Dictionary*," under AYODHYA.

UDENA'RDE, a town in the province of East Flanders, Belgium, is situated chiefly on the east bank of the Scheldt, 16 miles south-by-east from Ghent. It has a population of 8000, and possesses a fine Gothic council-house, important manufactures of linen and cotton fabrics, and many extensive tanneries. The town was

taken by the French, aided by an English force, in 1668; it was again besieged in 1674, by the stadtholder, William (III. of England) of Orange; and in 1706, it was taken by Marlborough. An attempt made by the French to retake it, brought on the famous battle of Oudenarde, one of Marlborough's most celebrated victories, which was gained, on the 11th July 1708, with the aid of Prince Eugene, over a French army under the Duke of Burgundy and Marshal Villars. After this battle, the French king made offers of peace, which were not accepted.

LOUDINOT, Charles Nicolas, Duke of Reggio, and Marshal of France, was born at Bar-le-Duc, in the department of Meuse, France, 25th April 1767. At the age of 17 he entered the army, but returned home after three years' service. Having distinguished himself in 1790 by suppressing a popular insurrection in his native district, he was, after some volunteer service, November 1793, raised to the rank of chief of brigade, in the fourth regiment of the line, and distinguished himself in various actions with the Prussians and Austrians. He was wounded and taken prisoner before Mannheim, by the Austrians, but was soon exchanged, and served in the armies of the Rhine under Moreau, and in that of Switzerland under Massena. He was promoted to be general of division (12th April 1799), and for a daring capture of a battery at Pozzola, was presented by the First Consul with a sabre of honor and the cannon which he had taken. In 1805 he received the Grand Cross of the Legion of Honor, and about the same time received the command of ten battalions of the reserve, afterwards known as the "grenadiers Loudinot." At the head of this corps, he did good service in the Austrian campaign. He was present at Austerlitz and Jena, and gained the battle of Ostrolinka (16th February 1807, for which he was rewarded with the title of Count, and a large sum of money. He greatly contributed to the success of the French at Friedland, and was presented by Napoleon to the Czar Alexander as the "Bayard of the French army, the knight *sans peur et sans reproche*." He sustained his now brilliant reputation in the second Austrian campaign of 1809, and on the 12th of July was created Marshal of France, and on 15th of August, Duke of Reggio. In 1810, he was charged with the occupation of Holland, and by his unswerving probity and attractive personal qualities, drew the esteem of all classes. He was engaged in the disastrous Russian campaign, and subsequently took part in the various battles of 1813 between the French and the Russians and Austrians. He was one of the last to abandon Napoleon, but he did so for ever, and spent the period known as the "Hundred Days" on his own estates. At the second restoration he became a minister of state, commander-in-chief of the royal guard and of the national guard, and was created a peer of France, Grand Cross of St Louis, &c. In 1823, he commanded the first division of the army of Spain, and was for some time governor of Madrid. After the revolution of July 1830, O. retired to his estates, and only at rare intervals presented himself in the Chamber of Peers. He became Grand Chancellor of the Legion of Honor in May 1839, succeeded Marshal Moncey as governor of the Invalides in October 1842, and died at Paris 18th September 1847. A statue was erected in his honor at Bar, 29th September 1850.—His son, CHARLES NICOLAS-VICTOR LOUDINOT, Duke of Reggio (born 8d November 1791), was a general in the French army. He first distinguished himself in Algeria, and in the Revolution of 1848—having previously distinguished himself as a deputy (1842—1846) by his admirable talent for dealing with questions affecting the comfort and discipline of the soldiery—he was chosen commander-in-chief of the army of the Alps. In April 1849, he was appointed general of the French expedition against Rome, and forced the city to surrender unconditionally on the 1st of July, in spite of the heroic resistance of the republican triumvirs—Garibaldi, Mazzini, and Saffi. He was, however, not a Napoleonist, and at the *coup d'état*, 2d December 1851, shared the fate of every eminent general who would not violate his oath to obey the constitution—i. e., he was arrested and imprisoned. He was soon set at liberty, and lived in retirement until his death in 1863. O. wrote several books of military matters.

LOUGREE, a town of Belgium, in the province of Liège, three miles south-south-west from Liège, on the right bank of the Mense. It has iron-works, a cannon-foundry, and oil and flour mills. The neighborhood produces coal. Pop. (1870) 6200.

LOUSTITIL. See MARMOSSET.

Ounce  
Oustram

**OUNCE.** The Latin *uncia* (derived by Varro from *unus*) was the name of the twelfth part of the *as* or *libra* (pound), and also was applied to the twelfth part of any magnitude, whether of length, surface, or capacity. Hence *inch*, the twelfth part of a foot. The modern ounce is a division of the pound-weight. See **POUND**.

**OUNCE** (*Felis Uncia*, or *Leopardus Uncia*), a large feline animal, nearly resembling the leopard, but having much rougher and longer hair, a longer and much more bushy tail; the general color is also paler, the rosette-like spots are less sharply defined, and there is a black spot behind the ears. Little is known of the O.; it is described by Buffon, but naturalists were for some time generally inclined to regard it as identical with the leopard, and its name has been transferred in South America to the Jaguar. It is a native of Asia, and probably of mountainous districts.

**OU'RARI.** See **CURARI**.

**OU'RO PRE'TO** (black gold), a city of Brazil, capital of the province of Minas Geraes, stands among barren mountains, 4000 feet above sea-level, and 200 miles north-north-west of Rio Janeiro. It contains the governor's residence and a college, and consists mainly of narrow and irregular streets. Although the neighboring mountains are very auriferous, and although the mines were once the richest in the kingdom, the mining is now reduced to comparatively unprofitable washings. A good trade in coffee, &c., is carried on with Rio Janeiro, but is retarded by the want of good roads. The journey from O. P. to the capital of the empire is performed by horses and mules only, and ordinarily requires 15 days. Pop. about 4000.

**OUSE**, called also for the sake of distinction, the **NORTHERN** or **YORKSHIRE** **OUSE**, a river of England, is formed by the union of the Swale and the Ure in the immediate vicinity of the village of Boroughbridge, and flows south-east past York, Selby, and Goole. About eight miles below the last town, it joins the Trent, and forms the estuary of the Humber. The length of its course from Boroughbridge is 60 miles, for the last 45 of which (from the city of York) it is navigable for large vessels. Its principal affluents are the Wharfe and the Aire from the west, and the Derwent from the north-east. The basin of the O., or the Vale of York, commences from the northern boundary of the county near the river Tees, from whose basin it is separated by a low ridge of hills, and extends southward, including almost the whole of the county. See **YORKSHIRE**.

**OUSE**, Great, a river of England, rises close to the town of Brackley, in the south of Northamptonshire, and flows north-east through the counties of Buckingham, Bedford, Huntingdon, Cambridge, and Norfolk, and falls into the Wash 2½ miles below King's Lynn. It is 160 miles in entire length, and is navigable for about 50 miles. It receives from the east and south the Ivel, Cam, Lark, and Little Ouse.

**OU'TCROP**, a term applied in Geology to the edge of an inclined bed at the place where it rises to the surface. The line of the outcrop is called the strike, which is always at right angles to the dip.

**OUTER HOUSE.** See **COURT OF SESSION**.

**OUTFIT ALLOWANCE**, in the British Army, is a sum of £150 for the cavalry, and £100 for the infantry, granted to non-commissioned officers promoted to commissions, to enable them to meet the heavy charges for uniform and equipments. The larger sum is given in the cavalry, because the newly-commissioned officer has to purchase his charger.

**OUTLAWRY**, in English Law, means putting one out of the protection of the law, for contempt in wilfully avoiding execution of legal process. Formerly, in the common law courts, if the defender would not enter an appearance, certain proceedings were taken to outlaw him, so as to allow the action to go on without his appearance. These proceedings, however, are now abolished, and, in the majority of cases, it is immaterial as regards the action whether the defendant appear or not, provided he was properly served with the original writ of summons. After judgment, he may still be outlawed, as a preliminary to seizing and selling his property. In criminal proceedings, outlawry still exists as part of the ordinary practice to compel a person against whom a bill of indictment for felony or misdemeanor has been found, but who will not come forward to take his trial, and who has not been arrested. In such

a case, process of outlawry against him is awarded, which is a kind of temporary judgment; and while this process exists, he is out of the protection of the law, and forfeits all his property. The courts will not listen to any complaint or attend to his suit till he reverse the outlawry, which is generally done as a matter of course.—In Scotland, outlawry or fugitancy is a similar process, and the defender must first be reponed against the sentence of outlawry before his trial can take place.

OUTPOSTS are bodies, commonly small, of troops stationed at a greater or less distance beyond the limits of a camp or main army, for the purpose of preventing an enemy approaching without notice, and also to offer opposition to his progress, while the main force prepares for resistance. Outguards march off to their position silently, and pay no compliments of any kind to officers or others. As soon as the officer commanding an outpost arrives on his ground, he proceeds to carefully examine the environs, noting all heights within rifle-range, roads and paths by which an enemy may approach, &c. He also takes such impromptu means of strengthening his position as occur to him—felling a tree here, cutting brushwood there, blocking a path in another place, and resorting to any expedient which may serve to delay the foe at point-blank range—an object of importance, as a stoppage at such a point is known to act as a great discouragement to advancing troops.

OUTRAM, Sir James, Lieutenant-general, G.C.B., Indian soldier and statesman, was born 1803, at Butterley Hall, Derbyshire, the residence of his father, Mr Benjamin Outram, a civil-engineer of note. His mother, the daughter of James Anderson of Monie, Aberdeenshire, was descended from Sir W. Seton, Lord Pitmedden. O. was educated at Edney, Aberdeenshire, under the Rev. Dr Blisset, and afterwards went to Marischal College, Aberdeen. He was sent to India as a cadet in 1819, and was made lieutenant and adjutant of the 23d Bombay Native Infantry. He then took command of and disciplined the wild Bheels of Candelish, and successfully led them against the Darning tribes. From 1835 to 1838, he was engaged in re-establishing order in the Muhl Kauts. He went with the invading army under Lord Keane into Afghanistan as aide-de-camp; and his ride from Kheilat, through the dangers of the Bolan Pass, will long be famous in Indian annals. He became political agent at Guzerat, and commissioner in Sindh, where he made a bold and earnest defence of the Amcers against the aggressive policy of General Sir Charles James Napier. He was afterwards resident at Sattara and Baroda, and upon the annexation of Oude, was made resident and commissioner by Lord Dalhousie. His health failing, he returned to England in 1856: but when the war with Persia broke out, and it became necessary to send an expedition to the Persian Gulf, O. accompanied the forces, with diplomatic powers as commissioner. He conducted several brilliant and successful operations; the campaign was short and decisive; and the objects of the expedition having been triumphantly attained, he returned to India. Landing at Bombay in July 1857, he went to Calcutta to receive Lord Canning's instructions, and was commissioned to take charge of the forces advancing to the relief of Lucknow. He chivalrously waived the command in favor of his old lieutenant, Havelock (q. v.), who had fought eight victorious battles with the rebels, and, taking up only his civil appointment, as chief-commissioner of Oude, tended his military services to Havelock as a volunteer. Lucknow was relieved, and O. took the command, but only to be in turn besieged. He held the Alumbagh against almost overwhelming forces, until Lord Clyde advanced to his relief. He then made a skilful movement up the left bank of the Gumti, which led to a final and complete victory over the insurgents. He was made chief-commissioner of Oude; and though he had strongly opposed its annexation, he was the man who did most to restore British rule, and attach the people to it. For his eminent services, he was promoted to the rank of lieutenant-general in 1858, and received the thanks of parliament in 1860. He took his seat as a member of the Supreme Council of India, but sank under the climate, and returned to England in 1860, already stricken by the hand of death. The communities of India voted him a statue at Calcutta, founded an institution to his honor, and presented him with commemorative gifts. A banquet was given to him and his chief and companion-in-arms, Lord Clyde, by the city of London. His English admirers determined to erect a statue to his honor in London, and gave him a valuable desert-service in silver. He spent the winter of 1861—1862 in Egypt; and after a short residence in the south of France, expired at Paris, March 11, 1863. O. was styled by Sir Charles Napier the "Bayard of India." Than his, there is no more gallant name

# Outtrigger Ovaries

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in the whole list of distinguished Indian soldiers. His services in the East as a soldier and a diplomatist extended over the period of forty years. He was ever the generous protector of the dark-skinned races among whom his lot was thrown, and set a bright example to all future administrators of moderation, conciliation, humanity, and practical Christianity in all his dealings with the natives of India.

OUTTRIGGER, in its proper sense, is a beam or spar fastened horizontally to the cross-trees or otherwise, for the purpose of extending further from the mast or topmast the backstay or other rope by which that mast or topmast is supported. The power of the stay is thus increased. The term is also used improperly—because no “rigging” is in question—to denote the apparatus for increasing the leverage of an oar, by removing the resistance, as represented by the side of the boat (see OAR), further from the power represented by the rower's hand. This is effected by fixing an iron bracket to the boat's side, the row-lock being at the bracket's extremity. The necessary leverage is thus obtained without adding to the width of the boat itself.

OUTWORKS, in Fortification, are minor defences constructed beyond the main body of a work, for the purpose of keeping the enemy at a distance, or commanding certain salient points which it is undesirable that he should occupy. Such works are ravelins, lunettes, hornworks, crown-works, demi-lunes, tenailles, &c. They occur in certain necessary order, as a ravelin before the curtain and tenaille, a hornwork before a ravelin, and so on.

OUZEL, or Ousel (Old Fr. *otael*, bird), an old name of the black-bird, as is evident from the descriptive lines of Bottom's song in “*Midsummer Night's Dream* :—

“The ouzel cock, so black of hue,  
With orange tawny bill.”

It is also applied to other birds, chiefly of the thrush family. Thus, one British thrush is called the Ring Ouzel. The Dipper (q. v.) is very generally known as the Water Ouzel; and the Rose-colored Pastor is also called the Rose-colored Ouzel.

OVAL, the name given to the figure presented by a longitudinal section of an egg through its centre. The oval has a general resemblance to the ellipse; unlike the latter, however, it is not symmetrical, but is thicker at one end than the other, and at the thin end, narrows almost to a point. The term “oval” is also used indiscriminately with “nodus,” “loop,” to denote the figure formed by a curve which either returns upon itself, as the lemniscata, &c., or the loops of the cubical and semi-cubical parabolas and other curves. In scientific language it is specially distinguished from the term “elliptical,” with which, in common parlance, it is usually confounded.

OVA'MPOS and OVAMPOLAND. The Ovampos or Otjherero are a tribe, seemingly a connecting link between the Kaffir and Negro races, who inhabit the region north of Great Namaqualand, in South Africa, extending north to the Cuanene River, and south to the parallel of 23° s. lat. The Ovampo tribes are described by Anderson as of a very dark complexion, tall and robust, but remarkably ugly. He found them, however, honest, industrious, and hospitable. They are not entirely pastoral, but cultivate much corn. Living in the same country are the Cattle Damaras, with still more of the Negro type, a stout, athletic people, very dirty in their habits, and generally armed with the bow and arrow. They live in a state of constant warfare with the Ghondannup, or Hill Damaras, a nearly pure Negro race, on the one hand, and the Namaqua Hottentots, who live south of them, on the other.

Ovampoland is a more fertile region than Namaqualand, from which it is separated by a wide belt of densely-bushed country. It has but few rivers, and these not of a perennial nature. About 50 miles from the coast, the country rises to a table-land about 6000 feet above the sea-level, and then declines to the south and east into the deserts of the Kalihari, and the region of Lake Ngami. Many strong indications of copper-ore are found in various places. The principal rivers, or rather water courses, are the Swakop, Kuisip, and their branches, which enter the Atlantic a few miles north of Walvis Bay. The other rivers in the interior seem to lose themselves in the sands. The climate is healthy, except near the coast, where fever in some seasons prevails. It seldom rains in the coast region, which is a very deso-

late one, and almost devoid of water. Thunder-storms are very violent in the summer season. All the large mammalia are found, more or less plentiful, according as water may be found at the different drinking-places. Elephants, rhinoceroses, elands, and other large animals driven from the south by the march of civilisation take refuge in the desert region lying east of Ovampoland, where sportsmen like Green and Andersson have been known to kill as many as twelve elephants in a day. The country was first described by Sir J. Alexander, who visited its south border. Mr Galton afterwards penetrated much further north; and Mr C. J. Andersson has since fully explored it nearly as far north as the Cuanene. Large numbers of horned cattle are annually collected by traders from the Cape in these regions, and whales abound on the coast. The trade in ostrich-feathers and ivory is of increasing importance, and several trading-stations are established for the collection of native products. Some elementary works have been printed in the Otjiherero dialect by the German missionaries; two appear in Sir G. Grey's catalogue.

O'VAR, a town of Portugal, in the province of Beira, 17 miles north from Aveiro, at the mouth of the small river Ovar, and at the head of one of the branches of the curious lagoon or bay called Ria d'Aveiro. See AVEIRO. It is a prosperous and rapidly increasing town, and carries on an extensive fishery and a considerable trade. Pop. (1864) 10,314.

O'VARIES are organs peculiar to the female, and are analogous to the testes in the male. They are two oblong flattened bodies (about an inch and a half in length, three-quarters of an inch in width, and nearly half an inch thick in the human subject), situated on either side of the uterus, to which they are connected by ligaments and by the Fallopian tube. On making sections of an ovary, numerous vesicles are seen. These are the ovaries of the future ova or germs, and are termed the *Graafian vesicles*. Before impregnation, they vary in number from ten to twenty, and from the size of a pin's head to that of a pea; but microscopic examination reveals the presence of young vesicles in large numbers. At each monthly period a ripe Graafian vesicle bursts, and the ovum contained in it makes its way by ciliary motion along the Fallopian tube to the uterus, where, if it is not impregnated, it is disintegrated and absorbed.

Solid tumors or cysts, containing hair and teeth, are developed in these organs, but their principal disease is that to which the name of *Ovarian Tumor* is applied. This tumor may be described as consisting of an enormous enlargement of one or more of the Graafian vesicles into a mass which may weigh 80 or 100 pounds, or even more; and it may be either simple (that is to say, composed of natural structures much hypertrophied) or cancerous. The walls of the cysts (or enlarged Graafian vesicles) may be thin and flexible, or thick and cartilaginous; and the fluid they contain may be clear and limpid, or thick and ropy, or grumous and opaque. The only disease with which it can be confounded is ordinary abdominal dropsy, or *Ascites*, and when its nature is clearly determined, three modes of treatment are open for adoption: these are (1) tapping, (2) various surgical and medical means of producing atrophy of the tumor, and (3) extirpation of the organ, or ovariectomy.

1. Tapping is the simplest mode of relieving the patient; but the cyst soon refills, and the operation must be often repeated. "Cases are extant in one of which the patient lived to be tapped 66 times at intervals of about a month, and in another, 128 times at intervals of six weeks; but, taken as a general rule, it may be affirmed that few patients survive more than four years after the first tapping, a period passed in the greatest misery and suffering."—Drnet's "Surgeon's Vade-mecum," p. 498.

2. Under this head are included both numerous operations for causing the tumor to waste, and its internal walls to adhere, and the internal administration of absorbent medicines, with the view of producing atrophy and absorption of the tumor. The injection of tincture of iodine into the previously emptied cyst, is sometimes followed with good results, as in the case of Hydrocele (q. v.).

3. Ovariectomy, or total extirpation of the morbid mass, is an operation regarding which there has of late years been much discussion. Its opponents urge (1) the difficulty of diagnosis; (2) the frequency of adhesion of the tumor to adjacent parts—a point which can often not be ascertained till the abdomen has been opened; and (3) the great mortality that follows it; while in favor of the operation it is urged (1)

that the mortality is not greater than from some other surgical operations which are regarded as justifiable; (2) that no other plan of treatment can effect a radical cure; (3) that if the surgeon, in order to complete his diagnosis, first makes a small incision, to enable him to ascertain the existence of adhesions, and closes it again with suture, if he finds this to be the case, no great harm is likely to result; and (4) that considering the miserable lives these patients lead during a course of tapping, &c., it is the most merciful course to adopt in patients who are young and otherwise healthy. For a description of the mode of performing the operation, and of the cautions to be observed, we may refer to a series of papers on Ovariectomy by Mr Spencer Wells in "The Medical Times and Gazette" for 1866 and 1869.

OVARY, in Botany. See GERMEN.

OVATION. See TRIUMPH.

OVEN, Field or Barrack, is a necessary apparatus in military economy to preserve the health of troops, by enabling them, at a comparatively small expenditure of fuel, to cook many rations together. In the British army, little attention was paid to such subjects, until, in 1858, the inquiries of Mr Sidney Herbert (afterwards Lord Herbert) brought to light the excessive mortality among soldiers, which was partly—and, as the event has shewn, justly—attributed to the bad cookery of their food. Captain Grant has bestowed much attention to army cookery, and has invented ovens for barrack use and for the field. While great improvements on the system—or want of system—which preceded them, these ovens are still admitted to be far from perfect in their arrangements.

For boiling meat, &c., in the field, detached cylinders are employed, which, when empty, join and floor over for use as pontoons; when in use they are united crosswise, one in the middle serving for a chimney. One or more empty barrels can be attached for steaming potatoes, and the roasting of coffee is performed, though not altogether successfully, in another cylinder made to revolve over the chimney. Up to the present time, other systems have been partially resorted to; but none has as yet been definitively adopted to the exclusion of others.

OVEN-BIRD (*Furnarius*), a genus of birds of the family *Corthiades* (q. v.), natives of the southern parts of South America, interesting on account of the remarkable nests which they construct. They are small birds, with short wings and feeble power of flight. One species, *F. albigularis*, or *F. rufus*, is found near Buenos Ayres; another, *F. fuliginosus*, inhabits the Malonine Islands. It is a fearless little bird, regarding the presence of man so little that it may be easily struck down with a switch. Both sexes take part in the construction of the nest, which is generally in an exposed situation, remarkably large, and of the shape of a dome, with a small entrance on one side, so as to have much resemblance to a rude oven. It is made of clay, grass, &c., well plastered together, and becomes quite firm as the clay dries in the sun. Internally, it is divided into two chambers by a partition reaching nearly to the roof, the eggs being placed in the inner chamber on a bed of soft grass and feathers. The outer chamber seems to be intended for the male.

OVER DARWEN is a very flourishing town of Lancashire, situated amid moorland hills,  $3\frac{1}{2}$  miles south of Blackburn, and  $19\frac{1}{4}$  miles north-west of Manchester, with which towns it is connected by the Lancashire and Yorkshire Railway. It has risen into wealth principally by a trade with India and China in calicoes. At present, there are about 250,000 spindles and 15,000 looms, contained in upwards of 40 mills and manufactories, at work in it. The "India Mill," erected to contain 100,000 spindles, is in every respect one of the finest in the country. It is a first-class stone building in the Italian style, with engine-house, chimney, &c., highly ornamented, is 100 feet high, and covers an area of 81,000 square feet. The town also contains the most extensive paper-staining works in England, 5 paper manufactories, 1 calico-printing establishment, as well as works for the manufacture of fire-bricks, tiles, and sanitary tubes, iron and brass founding, bleaching, machine and reed making. Coal-mines and stone quarries also find employment for a considerable number of the inhabitants. The places of worship are—4 churches, 8 Independent chapels; a Baptist, Wesleyan, Primitive, Methodist Free Church, and Roman Catholic chapel. There are large and commodious schools for elementary education. The town possesses a covered market, public baths, and a valuable free library. The central stores

of the Industrial Co-operative Society, erected in 1867, at a cost of £10,000, contain a public hall to accommodate 1500 people. This society numbers 2200 members, has 6 branches with £50,000 capital, and maintains a library of 2500 volumes, science classes, and well supplied news-rooms, free to members and their families. Pop. (1861) 11,702; (1861) 16,492; (1871) 21,978; and at the close of 1878, the estimate, on good authority, is given at 25,000.

OVERBECK, Friedrich, born at Lübeck, July 3, 1789, a distinguished painter, to whom is justly awarded a large share of the merit of the movement in the early part of this century, from which arose the modern German school of art. He commenced his studies as an artist at Vienna in 1806; but having adopted, and continued to persist in carrying out certain notions on art, and the mode of studying it, essentially different from those inculcated in the academy, he was expelled along with certain other students who entertained the same views, and in 1809 set out for Rome. Here he was soon afterwards joined by Cornelius and Schadow; and these three, animated with similar ideas, and mutually encouraging one another, laid the foundation of a school that now holds a high rank, and has in no small degree influenced the taste for art in Europe at the present time. A picture of the Madonna, which O. painted at Rome in 1811, brought him into marked notice. He was next employed along with Cornelius and others, by the Prussian consul, General Bartholdi, to execute certain frescoes illustrating the history of Joseph, the "Selling of Joseph" and the "Seven lean Years" being the subjects assigned to him. After completing these, he painted in fresco, in the villa of the Marchese Massimi, five large compositions from Tasso's "Jerusalem Delivered." In 1814, along with some of his artistic brethren, he abjured Lutheranism, and embraced the Roman Catholic religion. O.'s chief work is a fresco at Assisi, "The Miracle of Roses of St Francis." His oil pictures are inferior to his frescoes, being dry and weak in color. His great picture, "The Influence of Religion on Art," preserved in the Stadel Institute at Frankfurt, and well known from the engraving, is an admirable composition, and is indeed the most favorable specimen of his powers as a painter in oil colors. He executed a great many drawings remarkable for high feeling, most of which have been engraved. One of his last undertakings, a series of designs from the Evangelists, delicately engraved in the line manner, is a work of high excellence. O. adhered closely to those ideas of art which he started with—namely, entire devotion to the style of the Italian artists prior to the period of the renaissance, particularly Fra Angelico (b. 1387—d. 1455), and a strong impression that form or drawing in the style of Greek or classic art is inadmissible in works embodying religious subjects; although many of his compatriots—Cornelius, for instance—have modified, or perhaps enlarged these ideas, and study the works of Michael Angelo and those of Raffae's later style executed under the influence of classic art. O. resided in Rome from the time he went there as a student. He died November 1869.

OVERBURY, Sir Thomas, an English author and courtier, whose mysterious death has given a peculiar interest to his history, was the son of Nicholas Overbury, a Gloucestershire squire, and was born at Compton Scrofen, Warwickshire, the residence of his maternal grandfather in 1581. At the age of fourteen he entered Queen's College, Oxford, where he highly distinguished himself in logic and philosophy, and where he took the degree of B.A. in 1593. He then joined the Middle Temple, but soon after set out for the continent, from which he returned with the reputation of being a finished gentleman. While on a visit to Scotland in 1601, he met for the first time with his future murderer, Robert Carr (properly Ker), then a page in the service of the Earl of Dunbar. An intimacy unfortunately sprung up between the two, and Carr—a handsome ignoramus, sensual and unprincipled—followed his scholarly friend to London. On the accession of James to the English throne (1603), Carr rose rapidly into royal favor, and was created Viscount Rochester. Through his influence, O. was knighted in 1608, and his father appointed a judge for Wales. In return, O. gave his patron the benefit of his wit and judgment, both of which were singularly excellent; and, according to Hume, it was owing to O. that Carr enjoyed for a time the highest favor of the prince without being hated by the people. The circumstances that led to the rupture of their intimacy, and turned the earl into O.'s secret and relentless enemy, form one of the most flagrant scandals in the history of the English court. A brief outline of these circumstances is all that can be given here.



At the age of thirteen, Frances Howard, daughter of the Earl of Suffolk, was married (1606) to the Earl of Essex, himself only a year older. On account of their youth, it was reckoned advisable by their friends that they should not live together for some time. The boy-husband went away on his travels, and the wretched girl to her mother. After the lapse of nearly five years, Essex came home, and found his wife, now a splendid beauty of eighteen, the idol of all the court gallants. But there was not a touch of virtue or goodness in her whole soul. She had the disposition of a *Messalina* (q. v.) or a *Brinvilliers* (q. v.). For her husband she shewed the greatest aversion, and only consented to live in his house at the command of the king. It was well known that she had had intrigues with more than one lover, but in particular with Rochester, for whom she now cherished a fierce passion. O. had been instrumental in bringing about their guilty intercourse, and was now to reap the reward due to a pander. Rochester having told him that he purposed to get Lady Essex divorced from her husband, and then to marry her, O. strongly deprecated the idea, and declared that it would be disgraceful to form a union with so depraved a creature—she might do for a mistress, but not for a wife! The earl told Lady Essex what O. had said of her; she became furious for revenge, and offered Sir David Wood (between whom and O. there was a standing quarrel) £1000 to assassinate him, which that canny Scot declined to do. Rochester himself was now persuaded by his mistress to join privately in a plot against O., who on a most trivial and illegal pretext was thrown into the Tower, April 21, 1613. It was some time before he could bring himself to believe that his friend and patron was the cause of his imprisonment; but when he had assured himself of Rochester's treachery, he threatened to divulge certain secrets in his possession, whereupon it was determined by the earl and his mistress that he should be poisoned. This, after several trials, was successfully accomplished, and O. expired on the 15th of September. Rochester (now created Earl of Somerset), and his paramour were married on the 26th of December with great pomp, the brazen-faced beauty wearing her hair "as a virgin," and the whole affair was soon to appearance forgotten; but after George Villiers had supplanted the earl in the royal favor, an inquiry was instituted; Somerset and his wife were tried and found guilty of poisoning, but were, by an amazing and infamous stretch of the royal prerogative, pardoned. The motive for James's extraordinary clemency has never been ascertained; but the prevailing opinion is, that it was to prevent the disclosure of some discreditable, if not criminal, incidents in the private life of that monarch.

O. wrote several works, all of which were posthumously published. The principal are, "The Wife" (1614), a didactic poem; "Characters" (1614), the wit, ingenuity, precision, and force of which have long been admitted; "Crimmins Fallens from King James's Table" (1715). The latest edition of O.'s works is that by E. F. Rimbault with Life (1856).

**O'OVERLAND ROUTE** to India, the route generally chosen by those to whom time is a more important consideration than expense. The management of the route is in the hands of the Peninsular and Oriental Steam Company, who present the traveller with a choice of lines of route to Alexandria in Egypt. He may sail from Southampton *via* Gibraltar and Malta, reaching Alexandria in 13 days, a very convenient route for those who have much luggage, as no shifting is required till Alexandria is reached; or he may travel overland by railway and steamer to either of the ports of Marseille or Trieste. The shortest route from London to the former is *via* Dover, Calais, and Paris, Alexandria being reached in 11 days (including the necessary stoppages at different points on the route); and to the latter, *via* Dover, Calais, Paris, Turin, and Venice. The shortest route to India at present, after reaching Paris, is *via* Lyon, the Mont Cenis Tunnel, Modena, to Bindisi; from that Adriatic port by steamer to Port Said, thence through the Suez Canal and the Red Sea to Bombay, &c. Passengers may still be conveyed from Alexandria by rail to Suez, where they again embark on board the Peninsular and Oriental Company's steamers, and are conveyed to Bombay, Madras, &c. The time occupied in travelling from Alexandria to Bombay is 13 days, to Madras 24 days, and to Calcutta 29 days. Thus a traveller can reach Calcutta from London in 40 days; at an expense, however, of more than £100. The long sea-route round by the Cape of Good Hope cannot be accomplished by steamer in less than 94 days, and by sailing vessels it takes more than four months, but the cost is much less.

**OVERSEERS** are officers appointed annually in all the parishes in England and Wales, whose primary duty it is to rate the inhabitants to the poor-rate, collect the same, and apply it towards giving relief to the poor. These officers occupy an important position in all English parishes. They were first ordered to be appointed in each parish by the statute of 43 Eliz. c. 2, the leading Poor-law Act, which directed four, three, or two substantial householders in the parish to be nominated yearly, and a later statute fixed the time of nomination to be 25th March, or a fortnight thereafter. The courts have held that not more than four, nor less than two, can be appointed, the object being, probably, that so much responsibility should not be thrown on any one individual. Though it is usual for the vestry of the parish to nominate two persons to be overseers, still those who really appoint them are the justices of the peace, who are not bound to regard the wishes of the vestry in this respect. It is only householders in the parish who are qualified for the office, and though it is not necessary that they should actually reside in the parish, still they must occupy or rent a house there. Several classes of persons are exempt from serving the office, such as peers, members of parliament, clergymen, dissenting ministers, barristers, attorneys, doctors, officers of the army and navy, &c. But all who are not specially exempted by some statute are liable to serve the office, and even women may be appointed, though they scarcely ever are so in practice. The office is compulsory, and entirely gratuitous; and so necessary is it that some one shall fill the office, that it is an indictable misdemeanor to refuse, without cause, to serve when duly appointed. Though overseers are the proper managers of the poor for each parish, yet some parishes, especially in large overgrown towns, have been regulated by local acts, and guardians of the poor provided; and other parishes are under what is called a select vestry. In such cases, the overseers, though still appointed, are only allowed to give relief to paupers in certain urgent and exceptional cases, the ordinary regulation of poor-law affairs being confined to the guardians or the select vestry. The primary duty of the overseers consists in making, collecting, and applying the poor-rate for the relief of the poor of the parish, but, as will be seen, advantage has been taken by the legislature of the existence of these officers always representing the parish, to throw upon them various miscellaneous duties which are not directly connected with poor-law affairs.

1. Of the duties connected with the management of the poor. The overseers along with the church-wardens are to make a rate once or twice a year; i. e., a list of all the occupiers of lands and houses in the parish, specifying their names and the property occupied by each, and the ratable value and amount due by each. The next thing to be done is to go before two justices of the peace, and get the rate allowed—i. e., signed by them—and then it is published on the church-door on the following Sunday. The overseers must collect the rate also; but in all large parishes there is a collector of poor-rates who is specially appointed and paid for the purpose of collecting it. If a party refuses to pay the rate, the overseers must take proceedings before justices to compel payment, which is done by distraining the goods of the party, or, if there are no sufficient goods, by getting a warrant to imprison him. The party may, however, appeal against the rate to the Court of Quarter Sessions. When the money is collected, the overseers have to apply it towards the relief of the poor, and many other purposes of a kindred nature. Relief must be given to all the poor in the parish who are in a destitute state; but it is the duty of the overseers, when the pauper has not a settlement in the parish, to obtain an order of removal. i. e., to get an order of justices, under which the pauper is taken by force, and sent to the parish where he has a settlement. See **REMOVAL OF THE POOR**. Relief is given, in general, only in the workhouse, and according to certain rules and conditions. Where the parish is included in a poor-law union, as is now generally the case, then the duty of overseers in giving relief is entirely confined to certain urgent cases; for the guardians of the union administer the ordinary business of the workhouse, and of relief generally. Another duty incident to overseers of a parish in a union is the duty of making out valuation lists—i. e., a new valuation of the property in the parish—which list is ordered by the guardians with a view to produce some uniformity in assessing the burdens on the various occupiers. Formerly, the mode of valuing property for the purposes of the poor-rate was not subject to any uniform rule, and in some parishes the valuers made a larger deduction from the actual value than in others; but in 1862, a statute passed, called the **Union Assessment Act**, the

object of which was to enable new valuations to be made on a uniform plan, till the occupiers in all the parishes are treated alike. At the end of the year of office, the accounts of the overseers of parishes in unions are audited by a poor-law auditor, who is a paid officer, and who examines the vouchers, and sees that no illegal payments have been made.

2. The miscellaneous duties now imposed by statute on overseers, over and above their original duty of relieving the poor, are numerous. The most prominent, perhaps, is that of making out the list of voters for members of parliament. This duty is done in obedience to certain precepts issued by the clerk of the peace each year, who gives the overseers full instructions how to make out the lists, and what claims and objections to receive, and how to deal with them. The overseers must also attend the court of the revising barrister, when he revises the lists, and disposes of legal objections. Another duty of the overseers is to make out the list of persons in the parish qualified to serve as jurors. So they must make out the burgess lists when the parish is situated within a borough. They must also make out the list of persons qualified to serve as parish constables. They are also bound to appoint persons to enforce the Vaccination Acts; they must give notice to justices of all lunatics within the parish, and pauper lunatics are removed to the county asylum. They must also collect and enforce payment of the rates levied to pay the expenses of school-boards. The overseers must also perform certain duties as to the election of guardians for the union. They must also bury the dead bodies of persons cast on shore, and of all paupers who die in the parish. They also are the proper parties to protect village greens from nuisances; and in general, where there is no local Board of Health, the overseers are the parties bound to act in carrying out the Nuisance Removal Acts (see *NUISANCE*) within the parish, which of itself is an onerous duty. In general, whenever overseers are bound to do miscellaneous duties of this kind, they are authorised to pay the necessary expenses and disbursements out of the poor rate; but, as already stated, their services are gratuitous. The duties which in England are performed by overseers, devolve, in Scotland, upon the parochial board, the sheriff-clerk of the county, session-clerk, and others.

**OVERSEER, Assistant.** An assistant overseer is a paid officer, whose services have generally been found necessary in the larger parishes, in order to relieve the annual overseers of their burdensome office to some extent. Accordingly, the rate payers, in vestry assembled, appoint a person as assistant overseer with a salary, who performs most of the same duties as the overseers. In many cases, however, a collector of poor-rates has been appointed, who is also paid by salary, and in such a case he discharges like duties. Both the assistant overseer and the collector of poor-rates are bound to find security for the faithful discharge of their duties, and for duly accounting for moneys in their hands.

**OVERSTONE, Samuel Jones Loyd, Lord,** one of the most skilful political economists, and the ablest writer on banking and financial subjects that this country has produced. He was born in 1796, being the only son of Mr Lewis Loyd, descended from a respectable Welsh family, and a leading partner in the eminent banking house of Jones, Loyd, and Co. of London and Manchester. Having gone through a regular course of instruction at Eton, young Loyd was sent to Trinity College, Cambridge, where he had Dr Blomfield, late Bishop of London, for tutor, and where he acquired a very extensive acquaintance with classical literature, and with the history and literature of his own country and of Europe generally. On leaving Cambridge, Loyd entered the banking-house as a partner along with his father, and on the retirement of the latter, he became its head. He distinguished himself highly in his capacity of banker. He had a profound knowledge of the principles of banking, and these he applied on all occasions in conducting the business in which he was engaged. Far-sighted and sagacious, he was seldom deceived by appearances or pretensions, however specious. Perhaps, if anything, he was too cautious; but he was neither timid nor irresolute. He was eminently successful in the employment of the very large deposits at his command, and while he eschewed hazardous transactions, he did not shrink from engaging in very extensive operations when he believed they could be undertaken with a due regard to that safety which should always be the first consideration in the estimation of a banker.

Loyd entered parliament in 1819 as member for Hythe, which he continued to represent till 1826. He made several good speeches in the House; and was one of a

small minority that voted for the proposal to make bankers issuing notes give security for their payment. Though opposed to all changes of a dangerous or revolutionary character, Loyd has been always a consistent liberal. Having either withdrawn, or being on the eve of withdrawing from business, Loyd was raised to the peerage in 1850, by the title of Baron Overstone and Fotheringhay, county Northampton; and if great wealth, consummate intelligence in regard to matters of great public importance, and the highest degree of integrity and independence, be qualifications for a seat in the Lords, few peers have had a better title to be enrolled in that august assembly.

The first of Lord O.'s famous tracts on the management of the Bank of England, and the state of the currency was published in 1837, and was followed by others between that period and 1857. The proposal for making a complete separation between the banking and issue departments of the Bank of England, introduced by Sir Robert Peel into the act of 1844, was first brought forward in these tracts, and its adoption has been the greatest improvement hitherto effected in our banking system. Having been collected, these tracts were published in 1857 with extracts from evidence given by Lord O. before committees of the Lords and Commons. And it would not be easy to exaggerate the value of this volume. Lord O. has also reprinted, at his own expense, four volumes of scarce and valuable tracts on metallic and paper money, commerce, the funding system, &c., which he has extensively distributed.

An inquiry took place before a committee of the House of Commons in 1857 into the practical working of the act of 1844, and Lord O. was the principal witness who came forward in defence of the act; but several leading members of the committee being hostile to it, exerted themselves to overthrow his lordship's theories and opinions, and subjected him to a severe cross-examination; which gave Lord O. the opportunity of successfully vindicating the principles and practical working of the act. This evidence was published in a separate volume in 1857.

Lord O. does not often speak in the House of Lords. His speech on the commercial treaty with France is probably the best of his parliamentary appearances. He has also been a zealous opponent of the principle of limited liability. He was a leading member of the commission appointed to inquire into the proposal for the introduction of a decimal system of arithmetic, and powerfully advocated the opinion that it would be injurious rather than beneficial.

All who have the privilege of knowing Lord O. regard him as one of the most honorable, high-minded, and upright men in the empire. But his rigid adherence to principle in his writings, his dealings, and his conversation, and his undisguised contempt for twaddle and pretension of all sorts, have made him be generally looked upon as austere and without sympathy. Such, however, is not the fact. When proper cases for the display of sympathetic and generous feelings are brought before him, none evince them more strongly. We may add that his conversational talents are of the highest order.

**O'VERTURE** (from Fr. *ouverture*, opening), a musical composition for a full instrumental band, introductory to an opera, oratorio, cantata, or ballet. It originated in France, and received its settled form at the hands of Lullu. Being of the nature of a prologue, it ought to be in keeping with the piece which it ushers in, so as to prepare the audience for the sort of emotions which the author wishes to excite. Such is to a great extent the character of the beautiful overtures by Mozart to "Zauberflöte" and "Don Giovanni," by Weber to "Freischütz," and by Mendelssohn to his "Midsummer Night's Dream," which are enriched by snatches of the more prominent airs in these operas. In the end of last century, overtures were written by Haydn, Pleyel, and other composers, as independent pieces to be played in the concert room; this sort of overture being, in fact, the early form of what was afterwards developed into the **SYMPHONY** (q. v.). The overture, as well as the symphony, is designated by the name *sinfonia* in Italian.

**OVERYSSEL**, a province of the Netherlands, is bounded on the n. by Friesland and Drenthe; e. by Hanover and Westphalia; s. and s. w. by Gelderland; and w. by the Zuider Zee. It has an area of 1274 square miles; and (1874) a population of 263,008. The soil is sandy, with clay lands by the Yssel, rich pastures along the Zuider Zee and rivers, tracts of peat-land in various parts, and extensive heaths which are gradually being brought into cultivation. From south to north the pro-

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vince is intersected by an unbroken chain of sand-hills. The chief cities are Zwolle, Deventer, and Kampen; important manufacturing towns of less note being Almelo, Avereest, Dalfsen, Haaksbergen, Hardenberg, Hellendorn, Lonneker, Losser, Raalte, Staphorst, Steenwykerswold, Tubbergen, Weerselo, Wierden, Zwollerkerpel, &c. The principal employments are—agriculture, manufactures of various kinds, fishing, making peat, shipping and merchandise. In 1862, of 128,709½ acres under cultivation, 65,526 were in rye, 24,453 in potatoes, 18,367 in buckwheat, 763½ in oats, 4469 in barley; wheat, colza, beans, flax, carrots, &c., occupying smaller breadths. The stock consisted of 16,582 horses, 117,067 horned cattle, 80,352 sheep, 22,318 swine, and 8265 goats.

At Zwolle, Deventer, Kampen, Almelo, and Steenwyk, besides the ground produce, were sold 3,008,000 lbs. of butter, of 17½ oz. avoirdupois per lb. In O. 331,000 acres are still waste, 262,000 in pasture, and 7400 in wood.

Carpets are manufactured at Deventer and Kampen, leather at Blokzyl, calicoes and other cotton fabrics at Kampen, Almelo, Dalfsen, Ommen, and many other towns. There are extensive brick-works at IJsssen, Zwollerkerpel, Markelo, and Diepenveen, producing a yearly aggregate of 43,760,000. Ship-building is carried on at Zwartsloot, Vollenhove, Steenwykerswold, Avereest, &c. There are 74 Dutch Reformed clergymen, 98 Roman Catholic priests, and a few churches belonging to smaller Protestant sects. The attendance at school is about 1 to 9 of the population. In 1862, the births amounted to 7313, of which 206 were illegitimate, or about 1 to 35½; the deaths were 5673, or 42 to the 1000 of the population.

The principal rivers are the Yssel, into which the Schipbeek runs, and the Overyselsche Vecht, which falls into the Black Water. Other important water-ways are the Dodems-Vaart and the Willems-Vaart canals. There were, in 1873, 109 miles of railways in the province. The island of Schokland, in the Zuider Zee, belongs to Overysel.

O'VID (Publius Ovidius Naso), the descendant of an old equestrian family, was born on the 30th March 43 B.C., at Sulmo, in the country of the Peligni. He was educated for the bar, and under his masters, Arellius Fuscus and Porcius Latro, he became highly proficient in the art of declamation. His genius, however, was essentially that of the poet, and the writing of verses began to absorb the time that should have been spent in the study of jurisprudence. His father, having but a scanty patrimony to divide between two sons, discouraged this tendency in the younger, but in vain. By the death of his elder brother, O. inherited all his father's property, and went, for the completion of his education, to Athens, where he acquired a perfect mastery of the Greek language. He afterwards made a tour in Asia and Sicily along with the poet Macer. It is uncertain whether, on his return to Rome, he ever practised as advocate. Although by birth entitled to aspire to the dignity, he never entered the senate; his weakness of body and indolence of habit prevented him from ever rising higher than from the position of *triumvir capitalis* to that of a *decemvir*, who convened and presided over the court of the *centumviri*. While his public life was unimportant, his private was that of a gay and licentious man of letters. The restraint of the matrimonial tie was always distasteful to him; twice married in early life, he soon divorced each of his wives; while he carried on an intrigue with a lady whom he celebrated as Corinna, and who is believed to have been no other than Julia, the accomplished daughter of Augustus. Before his thirtieth year, he married a third time and became the father of Perilla, of whom he was tenderly fond. Up till his fiftieth year, he resided chiefly at Rome, in a house near the Capitol, and occasionally visited his Pelignian estate. His society was much courted, and his large circle of distinguished friends included Augustus and the imperial family. By an edict of the emperor, however, he was, in 9 A.D., commanded to leave Rome for Tomi, a town near the delta of the Danube, and on the very limit of the empire. The sentence did not condemn him to an *exilium*, but to a *relegatio*—or in other words, he did not lose his citizenship, nor was he cut off from all hope of return. The cause of this sudden banishment has long divided the opinion of scholars, since the one mentioned in the edict—the publication of his *Ars Amatoria*—was a mere pretext, the poem having been in circulation for ten years before. His intrigue with Julia, or with Julia's daughter, and the consequent displeasure of Augustus or of Livia, have been adduced with various degrees of plausibility, as the

cause of a sentence to which O. himself only mysteriously refers. The misery of his life on the inhospitable and barbarous shore of the Euxine is commemorated by the poems in the composition of which he found his solace. He became a favorite with the Tomiæ, whose language he learned, and before whom he publicly recited some poems in honor of Augustus. But his devotion to the emperor, and the entreaties addressed to the imperial court by himself and his friends, failed to shorten the term, or to change the scene of his banishment; so he died, an honored citizen of Tomi, 18 A.D., in his sixtieth year. His works which have come down to us, either in whole or in part, appeared in the following order: 1. "Amorum Libri III.," a revised and abridged edition of an early series. 2. Twenty-one "Epistolæ Heroidum." 3. The "Ars Amatoria." 4. "Remedia Amoris." 5. "Nux," the remonstrance of a nut-tree against the ill-treatment it receives from the wayfarer, and even from its owner. 6. "Metamorphoseon Libri XV." This is deservedly O.'s best-known work. It seems to have been written between the poet's fortieth and fiftieth years, and consists of all the transformations recorded in legend from the creation down to the time of Julius Cæsar, whose change into a star forms the last of the series. 7. "Fastorum Libri XII.," the first six of which are all that remain. The poem is a Roman calendar versified, and describes the appropriate festivals and mythic legends from materials supplied by the old annualists. 8. "Tristium Libri V.," written in elegiac metre, during the first four years of the poet's banishment. They are mainly descriptive of his miserable fate, and are full of appeals to the clemency of Augustus. 9. "Epistolarum ex Ponto Libri IV.," also written in elegiac metre, and similar in substance to the "Tristia." 10. "Ibis," a short satire against some traducer of the poet's. 11. "Consolatio ad Liviam Augustam," held spurious by some critics. 12. "Medicamina Fæcæ" and "Hallenticon," dubiously genuine, and of which we possess but fragments. Several of his works are entirely lost, the one best known to antiquity being "Medea," a tragedy.

The poetical genius of O. has always been admired. A masterly facility of composition, a fancy vigorous and rarely at fault, a fine eye for color, and a versification very musical in its flow, are the merits which have made him a favorite of poets from Milton downwards, in spite of his occasional slovenliness and falsity of thought. The best editions of O.'s entire works are Burmann's (Amsterdam, 1797), and the recent one of Merkel; while excellent commentaries on one or other of his poems have been published by Haupt, Ramsay, and Paley. A good translation of his "Metamorphoses" is that edited by Garth, with the assistance of Dryden, Addison, Congreve, and others; while special passages of the same poem have been admirably rendered by Mr D'Arcy Thompson.

OVIEDO, a pleasant and healthy city of Spain, capital of the modern province of the same name (the ancient Asturias, q. v.), stands on a plain between the rivers Nalon and Nora, 61 miles north-north-west of Leon, and 22 miles south-south-west of Gijón, on the Bay of Biscay. In the centre of the city is a handsome square, from which four principal streets, terminating in alamedas or promenades, branch off toward the north, south, east, and west, respectively. These main streets are connected by others, and all are clean and well-paved. Pure water is abundantly supplied by means of a long aqueduct, and is delivered to the city by eleven public fountains. The cathedral, a beautiful cruciform specimen of Gothic, the ornamentation of which is as rich as it is elegant, contains (in the Chapel of the Virgin) the remains of many of the early kings and princes of Asturias, and has a fine old library. Some curious, but eminently questionable relics, are to be found in the church of *San Miguel*, which is the second oldest Christian building after the Moorish invasion. In the immediate vicinity of the city there are other churches in the early Saxon style, which are among the oldest churches in the peninsula. The convent of San Vicente, founded in 1281, has been secularised, and is now occupied by government offices, &c. Linens, woollens, hats, and firearms are manufactured. Pop. 28,460.

O. was known during the middle ages as *Civilas Episcoporum*, because many of the Spanish prelates who had been dispossessed of their sees by the Moors, took refuge here. This city, which is the see of a bishop, was twice plundered of its ecclesiastical and other treasures during the war of independence; first by Soult, and subsequently by Bonnet.

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**OVIDEO Y VALDES**, Gonzalo Fer. De, a Spanish chronicler, born at Madrid in 1478, was sent by Ferdinand to St Domingo, in the West Indies, in 1514, as intendant and inspector-general of the trade of the New World. During his long residence in St Domingo, he spent his leisure in acquiring an extensive knowledge of the West Indies; and after his return to Spain published at Toledo, in 1535, a "Summario de la Historia General y Natural de las Indias Occidentales," which he dedicated to Charles V. He afterwards made some additions to the work, which was republished at Seville in 1635, in 21 vols., under the title of "La Historia General y Natural de las Indias Occidentales." He left other 29 books in manuscript. A complete edition is now being prepared at Madrid. O. died at Valladolid in 1557. Besides his "History of the West Indies," he wrote "Las Quinquagenas," a valuable, gossiping, and anecdotal account of all the principal personages of Spain in his time, which still remains in MS. in the royal library at Madrid; and chronicles of Ferdinand, Isabella, and Charles V. A life of Cardinal Ximenes is also attributed to him.

**OVIPAROUS**, a term applied to animals in which reproduction takes place by eggs (*ova*). Except the mammalia, all animals are either Oviparous or Ovoviparous (q. v.); the latter mode—which is not essentially different from the former—being comparatively rare. Even those invertebrate animals which multiply by gemmation and division, have also a true reproduction by *ova*. See *Egg* and *Reproduction*.

**O'VOLO**, a convex moulding much used in classic architecture. See *MOULDING*. In Roman architecture, the ovolo is an exact quarter of a circle; in Greek architecture, the curve is sharper at the top and quirked. It is sometimes used in Decorated Gothic.

**OVOVIVIPAROUS**, a term applied to animals of which the egg is hatched within the body of the mother, so that the young is excluded alive, although the fœtus has been enclosed in an egg almost to the time of parturition. It is probable that the egg is often broken in parturition itself. Some fishes are ovoviparous, and some reptiles; also the *Monotremata*. The Common Lizard and the Viviparous Lizard, both natives of Britain, are illustrations of the near resemblance which may subsist between oviparous and ovoviparous animals. The distinction is much less important than might be supposed.

**O'VULE** (Lat. a little egg), in Botany, the rudimentary seed. The Germen (q. v.) or ovary sometimes contains only one ovule, sometimes a small definite number, sometimes a large indefinite number. Ovules are to be regarded as metamorphosed buds. "The single ovule contained in the ovaries of Composites and Grasses may be called a terminal bud, surrounded by a whorl of adhering leaves or carpels, in the axil of one of which it is produced."—Balfour, "Manual of Botany." The ovule is not always contained in an ovary. In Gymnogens (q. v.) it is wanting, and the ovule is naked; but the plants possessing this character are comparatively few. The ovule is attached to the *Placenta* (q. v.), and by it to the *Carpel* (q. v.), from which it is developed. The attachment to the placenta is either immediate, when the ovule is said to be *sessile*, or by means of an umbilical cord (*funiculus*), which sometimes elongates very much after fecundation. The ovule is, in general, essentially formed of a cellular *nucleus* enclosed by two membranes, the outer of which is called the *primine*, and the inner the *secundine*. At one end of the nucleus there is an opening of both membranes—the *foramen*—through which the access of the pollen in Fecundation (q. v.) takes place. The *Chalaza* (q. v.) unites the nucleus and these membranes at the base. When the ovule is so developed that the chalaza is at the base, and the foramen at the apex, it is said to be *orthotropal* (Gr. *orthos*, straight, *tropos*, a mode). When the ovule is bent, so that the foramen is brought near to the base, it is called *campylotropal* (Gr. *kampylos*, curved). When by increasing on one side more rapidly than on the other, the ovule has its foramen close to the base, the chalaza being carried round to the opposite extremity, the ovule is *anatropal* (Gr. *anatrepo*, to turn upside down). Anatropal ovules are very common. When the ovule is attached to the placenta, so that the foramen and chalaza are at opposite ends, the base being in the middle, it is called *amphitropal* (Gr. *amphi*, around). When the ovule arises from the base of the germen, it is said to be *erect*; when it hangs from

the apex of the cavity of the germen, it is *pendulous*; when it arises from the side of the germen above the base, it is *ascending*; when it hangs from the side of the germen below the apex, it is *suspended*. When two or more ovules are found, not only in the same ovary, but in the same cell, they generally exhibit different modes of attachment. See CHALAZA, EMBRYO, FECUNDATION, GERMEN, PLACENTA, SEED.

OWEN, Dr John, an eminent Nonconformist divine, descended from an ancient Welsh family, was the son of the Rev. Henry Owen, vicar of Stadham, in Oxfordshire, and was born at the vicarage in 1616. In his 12th year he was entered of Queen's College, Oxford, where he worked with amazing diligence; for years taking no more than four hours' sleep a night. In 1635 he "commenced" M.A. At this period (if his own statement does not exaggerate) his great ambition was to acquire celebrity either in church or state, he didn't particularly care which; and he affirms the irreligiousness and worldliness of his motives with entire frankness. Yet he appears, for all that, to have been agitated even during his student-life by the *questiones vexatæ* of ecclesiastical politics, and made himself so conspicuous by his Anti-Laudinism, that he was forced to leave Oxford. In fact, his Puritanism had become so decided, that most of his former friends had abandoned his society. The next five or six years of his life were spent, speaking generally, in a state of anxious and melancholy introspection. When the civil war finally broke out, O. was living as chaplain with Lord Lovelace of Hurley, in Berkshire. His lordship was a royalist, and went to join the king's army, whither O., who had warmly espoused the cause of the parliament, could not accompany him. About the same time, his uncle, a gentleman of property in Wales, who, having no children of his own, meant to have made O. his heir, indignant at the zealous Puritanism of his nephew, settled his estate upon another, and died without leaving him a farthing. The almost friendless scholar now removed to London, where a casual sermon, preached by a stranger in Calamy's church, had the effect of imparting to his soul the peace he so ardently desired. In 1642, he published his "Display of Arminianism," a work that proved very acceptable to the Puritan party, and drew upon him the favorable regards of the House of Commons. Soon after, the "Committee for Purging the Church of Scandalous Ministers" presented him with the living of Fordham, in Essex. His ministrations were exceedingly popular, people coming from great distances to hear him preach. While residing at Fordham he married a lady named Rooke, by whom he had several children. Not long after he removed to Coggeshall, where his views of church government underwent a modification. Up to this point he had been a Presbyterian, but he now became a moderate Independent or Congregationalist. It is almost superfluous to add that the Presbyterian ministers—intolerant, dogmatical, and acrimonious to a degree that is scarcely credible—fell upon him at once for his apostasy, but failed to perturb his sober temper. At Coggeshall he wrote his "Salus Electorum, Sanguis Jesu" ("The Blood of Jesus, the Salvation of the Elect"), a work the result of seven years' study, and of which he himself said that "he did not believe he should live to see a solid answer given to it." His fame still increasing, he was sent for in 1646 to preach before the parliament. To his discourse, entitled "A Vision of Free Mercy," he added an Appendix, in which he pleads for liberty of conscience in matters of religion. He was again chosen to preach before the House of Commons the day after the execution of King Charles I. (January 31, 1649), but discreetly avoided a vindication of the act. About this time Cromwell made his acquaintance, and thought so highly both of his preaching and character, that he insisted on O. accompanying him to Ireland, where the latter remained about half a year. In 1650, he went with Cromwell to Scotland, and resided in Edinburgh for several months; in 1651, the House of Commons appointed him dean of Christ Church, Oxford; and in 1652, when only in his 36th year, he was admitted vice-chancellor of the university. The manner in which he discharged his duties reflects the highest credit on the impartiality of his disposition. Though himself an Independent, and owing his honors directly to the Independent party, O. never shewed himself a partisan. Most of the vacant livings in his patronage were bestowed on Presbyterians; and Episcopalians were allowed to celebrate divine worship in their own way, nor could the vice-chancellor ever be induced to offer them the slightest molestation. While at Oxford, the "Atlas of Indepen-



dency," as Wood grandiloquently dubs O., wrote his "*Diatriba de Divina Justitia*," his "*Doctrine of the Saints Perseverance*," his "*Vindicta Evangelica*"—against Biddle (q. v.) and the Socinians—and his "*Mortification of Sin in Believers*." He was one of the well-known "tryers" appointed to "purge" the church of "scandalous" (i. e., royalist) "ministers," and in this capacity signalled himself by his friendly offices on behalf of men of learning and merit, among whom may be mentioned the celebrated Dr Edward Pococke, professor of Arabic. A coldness now appears to have sprung up between him and Cromwell. O. is said to have been opposed to what many people call the "ambitious" designs of the Protector, and in 1657 he was succeeded as vice-chancellor of the university by Dr Conant. The year after Cromwell's death, he was ejected from his deanery, and retired to Stadham, in Oxfordshire, where he had purchased an estate, and where he formed a congregation, to which he ministered until his removal to London shortly after the Restoration. The writings belonging to this period of retirement, if we may so call it, are, "*Communio with God*;" "*On the Divine Original, Authority, Self-Evidencing Light and Power of the Scriptures*;" "*Theologoumena, or De Natura, Ortu, Progressu, et Studio vere Theologiæ*;" and an uncritical, ineffective, and unachiarly diatribe against Walton's "*Polyglott*," in which the different readings of Scripture were learnedly set forth. In 1663, he published "*Animadversions to Fiat Lux*," a treatise written by a Franciscan friar in the interests of Roman Catholicism. It was followed by works on "*Indwelling Sin*," on the 130th Psalm, and on "*The Epistle to the Hebrews*," the last of which began to appear in 1668, and is usually reckoned O.'s *Magnum Opus*. In 1669 he published "*Truth and Innocence Vindicated*," a reply to Samuel (afterwards Bishop) Parker's "*Discourse on Ecclesiastical Policy*," and in 1673 became pastor of a large congregation in Leadenhall Street. His last publications of importance were a "*Discourse Concerning the Holy Spirit*" (1674); "*Doctrine of Justification by Faith*" (1677), a treatise still much admired by many; and "*Christologia, or, Glorious Mystery of the Person of Christ*."

O. in his later years was held in the highest esteem by many of the most influential personages in the land, such as the Earl of Orrery, the Earl of Angleson, Lord Willoughby, Lord Berkley, Sir John Trevor. When drinking the waters at Tunbridge, even the Duke of York and Charles II. paid him particular attention, and had long conversations with him on the subject of Nonconformity. O. died at Ealing, 24th August 1683, and was buried in Bunhill Fields. His funeral was attended by no less than sixty noblemen. O. was the most voluminous, but by no means the most powerful writer among the Puritan divines. His prolix and passionless disquisitions, his dull, tedious, and exhausting argumentations, his lack of subtle spiritual perception, his ponderous and lumbering style, make his writings the reverse of interesting; and one can almost pardon the irreverent criticism of Robert Hall, who is said to have pronounced them a "confluent of mud." Yet O. deserves respect for his learning and moderation. The best edition of his works was published at Edinburgh (1856, *et seq.*).

OWEN, Richard, was born at Lancaster, July 20, 1804. Having received his elementary education at the grammar-school of that town, he became, at the age of 20, a student in Edinburgh University. Under the guidance of the third Monro, Alison, Jamieson, and Hope in the university, and of Barclay in the outdoor school, his natural talents early developed themselves. He was an active student, and with others of kindred spirit, formed the Hunterian Society, of which he was chosen president in 1825. In 1826, he removed to London, joining the medical school of St Bartholomew's Hospital; and to the Medical Society of this institution he communicated his earliest published paper: "*An Account of the Dissection of the Parts concerned in the Aneurism, for the Cure of which Dr Stevens tied the Internal Iliac Artery*," which appeared in the "*Medico-Chirurgical Transactions*" for 1830. It was doubted whether so deep-seated an artery could have been reached, but he showed that the ligature had been applied to the internal iliac, and the aneurism had in this way been obliterated.

It had been his intention to enter the navy; but when he finished his education, he accepted an appointment as assistant to Mr Clift, the Curator of the Museum of the Royal College of Surgeons, and helped him in the preparation of his catalogues of "*Pathological Specimens*" (1830), "*Mousters and Malformations*" (1831), but

chiefly of the "Specimens of Natural History in Spirits" (1830). He had, about this time, the fortune to obtain a specimen of *Nautilus pompilius*, an animal almost unknown, and of great importance not only in itself, but also and chiefly because of its numerous fossil allies. The results of his careful dissection of this specimen were published in an elaborate Memoir, which at once gave him a high position amongst naturalists, for the advanced views on structure and affinities it contained.

The continued examination of Hunter's extensive collections in the College of Surgeons' Museum was his great work. This resulted in the enlargement and arrangement of the collections, and in the publication of his "Descriptive and Illustrated Catalogue of the Physiological Series of Comparative Anatomy," which was issued in sections during 1833-1840; of his "Palæontological Catalogue," of which the Mammals and Birds were published in 1845, and the Reptiles and Fishes in 1854; and of his "Catalogue of Recent Osteology" (1854), in which he describes 5906 specimens. The collections, which in 1828 were contained in one small badly-lighted room, in 1856, when O.'s connection with them terminated, filled ten times the original space—three large galleries having been specially erected to contain them.

O.'s position as curator of the Hunterian Museum, to which he succeeded on the death of Clift, awakened in him a special interest in its famous founder. In 1837, he published a new edition of Hunter's "Animal Economy," adding to it all the known published papers of its author; and giving in the preface, for the first time, a descriptive narrative of Hunter's real discoveries. He afterwards edited two volumes of "Essays and Observations on Natural History, Anatomy, &c., by John Hunter" (1861), which had been saved from Home's unprincipled and barbarous destruction of Hunter's manuscripts, by having been transcribed by Clift, who was the last articulated apprentice of Hunter. In the preface to these volumes, O. showed the advanced views which Hunter entertained in Geology and Palæontology.

The first appointment of O. as public lecturer was to the chair of Comparative Anatomy in St Bartholomew's Hospital in 1834. Two years afterwards, he succeeded Sir Charles Bell as Professor of Anatomy and Physiology in the College of Surgeons, and was in the same year appointed by the College as first "Hunterian Professor." For twenty years he continued to illustrate the recent and fossil treasures of the museum, until, in 1856, he was appointed Superintendent of the Natural History Department of the British Museum, when his connection with the College of Surgeons ceased.

We have not space to record even the principal of O.'s numerous published papers. His earliest communications to the Royal Society were papers on the generation of the ornithorhynchus and of the kangaroo. In numerous Memoirs between 1835 and 1862, he expounded the structure and affinities of the higher quadrumina; and in these and other papers, he proposed the use of the brain-structure, as an important element in classification. It has been objected, that the particular parts to which he referred in characterising his highest class, are found in the lower classes; but the objectors forget that he does not use the existence of the parts as his characters, but only their remarkable development. A similar objection may be urged against every system of classification, for no decided line can be drawn around any group, the whole animal world being united by a gradation of structure.

His exposition of the recent and fossil birds of New Zealand is well known. He first published two elaborate papers on the anatomy of the Apteryx, and then followed at intervals seven or eight monographs on the gigantic stinthonic Birds which once existed in these distant islands. His descriptions and restorations of extinct animals are perhaps the most important of all his labors. He has published a monograph of the British Fossil Mammalia and Birds, and six parts of an elaborate systematic history of British fossil Reptiles. In describing the fragmentary fossil relics brought home by Darwin from South America, he established many remarkable forms from very scanty materials, and showed that there existed in America, during the Tertiary period, a mammalian Fauna, the individuals of which were, for the most part, of gigantic size, yet similar in type to the existing animals of that continent. Subsequently, he clearly expounded the various genera of huge sloths from the same region, whose remains were previously confounded or misunderstood. A series of fossils from Australia revealed to him a remarkable group of gigantic marsupials, resembling in type the present tenants of that island-continent. His latest palæontological paper is his elaborate Memoir on the singular long-tailed

bird from Solenhofen, in which he for the first time expounded the structure and affinities of that anomalous creature. But we cannot even record the titles of his multitudinous researches on extinct animals, and must refer our readers, for a summary of them, to his work, "*Palæontology*" (Edin. Black, 1861).

His great work on the microscopic structure of the teeth must be named. The "*Odontography*," published in 1840-1845, contains descriptions and exquisite drawings of the minute structure of a very extensive series of the teeth of every class of animals, and forms an immense store-house of information alike to the anatomist and the geologist.

He has published original papers on every branch of the animal kingdom, living and fossil; and it has been justly said of him, that "from the sponge to man, he has thrown light over every subject he has touched." Some idea of the magnitude of his labors may be formed from the fact that his published productions amount to more than 800 different papers and works, many of them being of the most voluminous and laborious character.

O., in 1835, married the only daughter of Cliff, his colleague at the College of Surgeons. In 1858, he resumed his position as Fullerian Professor of Physiology in the Royal Institution of Britain, which, some 20 years before, he had filled for two sessions; and in the following year he was appointed Reader Lecturer by the University of Cambridge, but has now resigned these offices. He is a Fellow and active member of most of the metropolitan scientific societies, one of the eight foreign associates of the Institute of France, and an honorary member of many foreign societies. From France he also received the order of the Legion of Honor; from Prussia, the *Ordre pour le Mérite*; and from Italy, the Order of St Maurice and St Lazare. He was made a companion of the Bath in 1873.

OWEN, Robert, a social theorist and schemer, was born on the 14th of May 1771, at Newton, in Montgomeryshire. He does not appear to have had any more than a merely commercial education to fit him for common business. The point from which his peculiar destiny in life may be said to have started, was his marriage in 1799 to the daughter of David Dale, the owner of the celebrated cotton mills at New Lanark, on the Clyde. This establishment was very successful as a money speculation, and it is curious that Jeremy Bentham made a small fortune by investing in it. Mr Dale was known to be a thorough man of business, but whether O., by his peculiar faculties for organisation, contributed to the prosperity of the establishment in its early stages, is a doubtful question. It is certain that as his larger schemes developed themselves, he was felt to be a dangerous partner in a good business, and he was gradually elbowed out of any voice in the management, and he finally disposed of his share in the property.

It should be remembered, however, of a man whose life will go down to posterity as one long absurdity, that in his connection with New Lanark Mills he did real practical good on a scale by no means limited. He was naturally active and interfering, and being a humane man, it struck him that much degradation, vice, and suffering arose from the disorganised manner in which the progress of machinery and manufactures was huddling the manufacturing population together. He introduced into the New Lanark community education, sanitary reform, and various civilising agencies, which philanthropists at the present day are but imperfectly accomplishing in the great manufacturing districts. The mills became a centre of attraction. They were daily visited by every illustrious traveller in Britain, from crowned heads downwards, and it was delightful not only to see the decency and order of everything, but to hear the bland persuasive eloquence of the garrulous and benevolent organiser.

A factory was, however, far too limited a sphere for his ambition. He wanted to organise the world; and that there might be no want of an excuse for his intervention, he set about proving that it was in all its institutions—the prevailing religion included—in as wretched a condition as any dirty demoralised manufacturing village. Such was the scheme with which he came out on the astonished world in 1816, in his "*New Views of Society, or Essays on the Formation of the Human Character*;" and he continued, in books, pamphlets, lectures, and other available forms, to keep up the stream of excitation till it was stopped by his death. He had at least three grand opportunities of setting up limited communities on his own principles—one at Romney, in America; a second at Orbiston, in Lanarkshire; the

third at Harmony Hall, in Hampshire, so lately as the year 1844. They were, of course, all failures, and O. attributed their failure to their not being sufficiently perfected on his principles. His life was a remarkable phenomenon, from the preternatural sanguineness of temperament which, in the face of failures, and a world ever growing more hostile, made him believe to the last that all his projects were just on the eve of success. In the revolution of 1848 he went to Paris, with hopes of course on the highest stretch; but his voice was not loud enough to be heard in that great turmoil. He appeared at the meeting of the Social Science Association at Liverpool in the autumn of 1853, with all his schemes as fresh as ever. He died a few weeks afterwards, on 17th November 1858. A life of O. by A. J. Booth appeared in 1869 (Trübner).

OWL, a numerous and extremely well-defined group of birds, constituting the Linnean genus *Strix*, now the family *Strigidae*, the whole of the nocturnal section of Birds of Prey. The aspect of the owls at once distinguishes them from all other birds, being rendered very peculiar by the large size of their heads, and by their great eyes, directed forwards, and surrounded with more or less perfect discs of feathers radiating outwards, whilst the small hooked bill is half concealed by the feathers of these discs, and by bristly feathers which grow at its base. The bill is curved almost from its base; the upper mandible not notched, but much hooked at the tip. The claws are sharp and curved, but, like the bill, less powerful than in the *Falconidae*. The outer toe is generally reversible at pleasure, so that the toes can be opposed two and two, to give greater security of grasp. The wings, although generally long, are less adapted for rapid and sustained flight than those of the diurnal birds of prey, and the bony framework by which they are supported and the muscles which move them, are less powerful; the owls in general taking their prey, not by pursuit, but by surprise, to which there is a beautiful adaptation in the softness of their plumage, and their consequently noiseless flight; the feathers even of the wings being downy, and not offering a firm resisting surface to the air, as in falcons. The soft and loose plumage adds much to the apparent size of the body, and also of the head; but the head owes its really large size to large cavities in the skull between its outer and inner tables or bony layers, which cavities communicate with the ear, and are supposed to add to the acuteness of the sense of hearing. This sense is certainly very acute, and the ear is, in many of the species, very large. It is furnished with an external conch, which is found in no other birds. It is, however, concealed by the feathers, being situated on the outside of the disc which surrounds the eye; but the feathers immediately surrounding the ear are arranged in a kind of cone, serving a purpose like that of an ear-trumpet. In some species, the ear is furnished with a remarkable lid or operculum, which the bird has the power of opening and shutting at pleasure. The disc which surrounds the eye serves to collect rays of light and throw them on the pupil; and owls can see well in twilight or moonlight, but are generally incapable of sustaining the glare of day, many of them becoming quite bewildered when exposed to it, and evidently suffering pain, which they instinctively seek to relieve by frequent motion of the third eyelid or nictitating membrane of the eye. The legs and feet of owls are feathered to the toes, and in many species even to the claws.

The digestive organs much resemble those of the *Falconidae*, but there is no crop, and the stomach is more muscular. The gullet is very wide throughout, and owls swallow their prey either entire or in very large morsels. The largest species feed on hares, fawns, the largest gallinaceous birds, &c.; others on small mammals, reptiles, birds, and sometimes fishes; some feed partly or chiefly on large insects.

The owl has from early time been deemed a bird of evil omen, and has been an object of dislike and dread to the superstitious. This is perhaps partly to be ascribed to the manner with which it is often seen suddenly and unexpectedly to flit by when the twilight is deepening into night; partly to the fact, that some of the best-known species frequent ruined buildings, whilst others haunt the deepest solitudes of woods; but no doubt, chiefly to the cry of some of the species, hollow and lugubrious, but loud and startling, heard during the hours of darkness, and often by the lonely wanderer. It is evidently from this cry that the name of owl is derived, as well as many of its synonyms in other languages, and of the names appropriated in

different countries to particular species, in most of which the sound *Oo* or *Ow* is predominant, with great variety of accompanying consonants. Many of the owls have also another and very different cry, which has gained for one of them the appellation screech owl, and to which, probably, the Latin name *strix* and some other names are to be referred.

Some of the owls have the discs of the face imperfect above the eyes, the whole aspect somewhat approaching to that of falcons; the conchs of the ears small, and the habits less nocturnal than the rest of this family. These constitute one of the three generally received divisions in which the species are arranged. Another division with more perfect discs around the eyes, is characterised by the presence of two feathery tufts on the head, popularly called horns, or ears, and sometimes aigrettes or aligrettes. The third division is destitute of these tufts, the discs of the face are perfect, and the ears are very large. On these distinctions, and on the feathered or unfeathered toes, and other points not of great importance, are founded the genera into which the Linnæan genus *Strix* has been broken down by recent ornithologists. See, for example, the characters of *Bubo* in the article EAGLE OWL.

Owls are found in all parts of the world, and in all climates. Ten species are reckoned as natives of the British Islands, some of which, however, are very rare, and about fifteen are natives of Europe. Some of the species have a very wide geographical range. One of the most plentiful British species is the WHITE OWL, or BARN OWL, or SCREECH OWL (*Strix flammea*), one of those having perfect discs around the eyes, and no aigrettes. It is about fourteen inches in its whole length. The tail is, as in most of the owls, rather short and rounded; the wings reach rather beyond the tail. The toes are not feathered. The head and upper parts are of a pale orange color, marked by a multitude of small, scattered chestnut-colored spots, and gray and brown zig-zag lines; the face and throat white. This owl very generally frequents old buildings and outhouses. It destroys great numbers of rats and mice, and deserves the protection of the farmer. The voracity of owls is wonderful, and they kill, if possible, more than they need, storing it up for future use. The barn owl is easily tamed if taken young. When irritated, it has, like some other—perhaps all—owls, a habit of hissing and snapping its mandibles together. It almost never leaves its retreat by day, unless driven out; and when this is the case, all the little birds of the neighborhood congregate about it as an enemy which may then be safely annoyed, and the grimaces of the poor owl, blinded by the too strong light, are very grotesque and amusing. This species has been said to be an inhabitant of almost all parts of the world, but there is reason to think that similar species have been confounded.—The TAWNY OWL, BROWN OWL, or IVY OWL (*Strix*, or *Syrnium, atridula*, or *aluco*) is another of the most common British owls, a species about the size of the barn owl, or rather larger, with rather longer tail, and comparatively short wings, the feet feathered to the claws; the upper parts mostly ash-gray mottled with brown, the under parts grayish-white and mottled.—The LONG-EARED OWL (*Strix otus*, or *Otus vulgaris*) and the SHORT-EARED OWL (*S.* or *O. brachyotus*), species with aigrettes, are not unfrequent British birds. The EAGLE OWL (*q. v.*) occurs, but is rare.—Of the species with imperfect discs around the eyes and more falcon-like aspect, the most interesting in the British fauna is the SNOWY OWL (*Strix*, or *Syrnium, nyctea*), the *Harfang* of the Swedes, a species occasionally seen in the Shetland Islands, and very rarely in more southern regions in winter, but well known in all the very northern parts of the world. It is from 22 to 37 inches in length, feeds on every kind of animal food which it can obtain, and has white plumage spotted and barred with brown, the legs densely feathered to the claws.—Of owls not natives of Britain, one of the most interesting is the BURROWING OWL (*Strix*, or *Athene, cucularia*), a North American species, which, when necessary, excavates a burrow for itself, but prefers to take possession of those of the marmot, called the Prairie Dog (*q. v.*). It is not the only species of owl which inhabits holes in the ground.—The BOOBOOK or BOOKBOOK of Australia (*Strix*, or *Noctua, Boobook*) is a species of owl, which frequently repeats during the night the cry represented by its name, as if it were a nocturnal cuckoo. Some of the species of owl are small birds; among the rarer British species are one of 8½ inches, and one scarcely more than 7 inches long. Some owls are at least partially birds of passage, of which, among British species, the short-eared owl is an example.

OWLGLASS (Ger. EULENSPIEGEL), Tyll, the prototype of all the knavish

"fools" of later time, is said to have been born in the village of Knechtlingen, in Brunswick. His father was called Klaus Eulenspiegel, and his mother Anna Wortbeck. In youth, we are told, he wandered out into the world, and played all manner of tricks on the people whom he met with. His tomb is shewn at Mölln, about four leagues from Lübeck, where tradition makes him die about 1350; but the inhabitants of Damme, in Belgium, also boast of having his bones in their churchyard, and place his death in 1301, so that several critics regard Eulenspiegel as an altogether imaginary person, a mere *nominis umbra* affixed to a cycle of medieval tricks and adventures. The opinion, however, considered most probable is that Eulenspiegel is not a myth, but that there were two historical individuals of that name, father and son, of whom the former died at Damme, and the latter at Mölln. The stories that circulate in Germany under Eulenspiegel's name were not collected, as the book containing them itself informs us, till after Eulenspiegel's death, and without doubt were originally written in the Low German tongue; from Low German, they were translated into High German by the Franciscan Thom. Murner, and this translation was followed in all the old High German editions of the work. At a later period, it underwent considerable alterations, at the hands of both Protestants and Catholics, who made it a vehicle for the expression of their own likings and dislikes. The oldest known edition is that printed at Strasburg in 1519. The verdict of modern times has been unfavorable, not only to the æsthetic, but to the moral value of the book; yet although indecencies may be found abundantly in it, they may perhaps in large measure be attributed to the age in which Eulenspiegel or the author of Eulenspiegel lived. For centuries it has been a favorite people's book, not only in Germany, but in many other countries. Translations of it exist in Bohemian, Polish, Italian, English (as a "Miracle Play"), Dutch, Danish, French, and Latin; it has been frequently imitated, and reprinted times without number down to the most recent years. Max Müller, in his "Lectures on the Science of Language" points out that Eulenspiegel is the origin of the French word *espégle*, waggish. When the stories about Eulenspiegel were translated into French, he was called Ulespiègle, "which name contracted afterwards into *Expégle*, became a general name for every wag."

OWNERSHIP is not a legal term, though it is used frequently in law to denote the highest degree or kind of property which one can have in anything. Owner is often used in this sense as contradistinguished from an occupier, who has only a temporary interest in the property. Thus a freeholder, or one who holds a freehold estate in land, is an owner; though, in common parlance, it is not unusual also to describe as owner any one who has a long lease of the property. When a person is owner in fee of land, he has certain rights more or less absolute as incidental thereto; for example, he may build on his land as high as he pleases, subject only to doing no direct injury to his neighbor, such as darkening his windows; and he may dig as deep as he pleases, or, as it is said, to the centre of the earth. There are certain things which are said to be incapable of ownership, such as the air, the sea, and the water of navigable rivers, as to each of which every individual member of the public has the right merely of using it, but no one has the ownership—i. e., the exclusive right of property as well as possession thereof. As to things wild, such as birds, beasts, fishes, the rule is that he who first catches the animal becomes the owner thereof, and acquires such a property in it, that any one who takes it from him against his will commits larceny. But though the person who first catches a wild animal is entitled to it, penalties are sometimes imposed upon the person catching it, as to which see GAME, POACHING. In regard to lost property—i. e., property which had once been appropriated and possessed by some one, but who has casually lost or abandoned it—the rule is that he who finds it is entitled to keep it, provided at the time of finding it he had no means of ascertaining the owner. But the true owner, if he discover and can identify the property, can always in general reclaim it from the finder. See LOST PROPERTY.

OX (*Bos taurus*), a ruminant quadruped of the family *Bovidae* (q. v.), the most useful to man of all domesticated animals. The species is distinguished by a flat forehead, longer than broad; and by smooth and round tapering horns, rising from the extremities of the frontal ridge. But among the many varieties or breeds which exist, there are great diversities in the length and curvature of the horns, and some are hornless. It is probable that the ox is a native both of Asia and of Europe, per-

haps also of Africa; and not improbable that it may have been domesticated at different times and in different countries. It cannot be confidently asserted that it now exists anywhere in a truly wild state; wild oxen are nowhere so abundant as on the pampas or great grassy plains of South America, where it is certain that they are not indigenous; and it is not impossible that the wild oxen still existing in the parks of a few noblemen in Britain may be also descended from domesticated animals. Whether or not the *Uroa*, described by ancient authors as an inhabitant of Central Europe, was the original of the domestic ox, will be considered in the article *Uroa*. The very early domestication of the ox is attested by the mention made of it in the writings of Moses, and by the worship of it in Egypt, which the Israelites imitated in making their golden calf at Mount Sinai. Yet oxen do not appear to have formed any part of the wealth of the patriarchs. The ox was probably used as a beast of burden or draught before it was valued for its milk. It is mentioned by Cæsar as the principal part of the wealth of the Britons at the time of the Roman invasion.

The ox is more frequently employed as a beast of burden and of draught in some parts of the continent of Europe than in Britain. From the earliest historic times, the horse has been more generally thus employed in Britain, and has now almost entirely superseded the ox. The gait of the ox is slow and plodding, but its strength enables it to perform a great amount of work, and it is not easily exhausted. It needs, however, intervals of rest inconvenient for the farmer; and it is not capable of exertion at all equal to that of the horse on any occasion of emergency.—The ox is chiefly valuable for its flesh and its milk; but almost every part of the animal is useful—the fat, skin, hair, horns, intestines.

The period of gestation of the ox is nine months, or 270 days. It rarely produces more than one calf at a birth. It attains maturity in two or three years, becomes evidently aged at ten, and seldom lives more than fourteen. Cows are seldom kept for the dairy after they are seven or eight years old, as after that age they yield less milk and of inferior quality. Modern husbandry has also found means to fatten cattle for the market at an earlier age than was formerly usual; and although the beef is not quite so good in quality, the profit is great, both to the farmer and to the community, through the increased productiveness of the land.

The ox is gregarious, and where circumstances permit, as in the South American plains, associates in very large herds. Herds of oxen defend themselves with great vigor against the large feline animals and other assailants, the younger and weaker animals being placed in the middle, whilst the bulls in the outer rank confront the adversary with their horns.

The varieties or breeds differ very much in size. Among those which occur in the British Islands, the Shetland breed is not much larger than a calf of some of the others. Some of the breeds of the torrid zone are also very small; but the fatty hump on the back may probably be regarded as indicating a connection with the Indian ox or Zebu (q. v.), which, although it has been generally regarded as a variety of the common ox, is perhaps a distinct species.—The "wild ox," now existing only in a few parks, as at Chillingham and Hamilton, seems, whatever its origin, to have been formerly an inhabitant of many forest districts in Britain, particularly in the north of England and south of Scotland. The Chillingham wild oxen are of a creamy white color, much smaller than many of the domestic breeds, of a graceful form, with sharp horns, which are not very long, and not very much curved. The uniform white color is to be ascribed to the care taken to destroy every calf which is not perfect in this respect. The habits of these wild oxen are very similar to those of the domestic races.—The *West Highland* breed, or *Kyloe*, differs very little from the Chillingham or Hamilton wild ox, except in being generally black. It has short muscular limbs, a wide and deep chest, well-arched ribs, and a straight back; the horns are often somewhat long; the muzzle is short, but not broad; the skin is closely covered with shaggy hair. The milk is very rich, but the quantity is so small, that this breed is very unsuitable for dairy farming. The beef, however, is of the finest quality, and great numbers of cattle, reared in the Highlands and Hebrides, are annually conveyed to other parts of the country, to be fattened on rich pastures. The breed is a very hardy one, and peculiarly suited to the region in which it prevails.—The *Galloway* breed is very like the preceding, but larger and destitute of horns; and many cattle

reared in the hilly parts of Galloway are fattened on English pastures for the London market.—The *Pembroke* and other Welsh breeds are not unlike the West Highland; but the cows yield milk more abundantly.—The diminutive *Shetland* breed is very hardy, and is celebrated for the fine quality of its beef. The Shetland ox is easily fattened, even on scanty pasturage. The milk which the cows yield is also remarkably abundant in proportion to their small size.—The *Ayrshire* breed is particularly celebrated for the abundance and excellence of its milk, but the beef is of inferior quality, and the animal is not easily fattened. Great care has been bestowed on this breed in Ayrshire and neighboring counties, where dairy farming is much practised. The horns are smaller than those of the West Highland breed, the hair much smoother, and the color chiefly brownish-red, with large patches of white.—The *Alderney* breed much resembles the Ayrshire, but the milk is comparatively small in quantity, and remarkable for the richness of the cream, on which account Alderney cows are often kept for the supply of private dairies. The milk of an Alderney cow, mixed with that of a dozen other cows, will sensibly improve the quality of the butter. But this breed is worthless for the purposes of the grazier.—The *Suffolk Dun* is a polled or hornless breed, of clumsy form, and of little value to the grazier, but yielding a very large quantity of milk, on which account Suffolk has long been celebrated for its dairy produce.—The *North Devon* is a pretty large breed, with rather short horns, very muscular and powerful, and also very gentle and docile, so that it is particularly adapted for draught; and much agricultural labor is still performed in Devonshire by teams of oxen of this breed. The North Devon breed, however, is surpassed by others, both for the purposes of the dairy farmer and of the grazier.—The *Hereford* breed, of stouter form than the Ayrshire, but in some respects not unlike it, has long been in great repute both for its beef and its milk; but in the districts where it once prevailed, it is now giving place to the *Short-horn* breed, one of the new breeds which are the result of care and attention. The *Short-horn* breed, so called because the horns are shorter than in almost any other, originated about the beginning of the 19th c. on the banks of the Tees, and has spread very widely both in England and in Scotland, in the districts of richest pasturage. The color varies from pure white to bright red; the head is short and very broad; the chest is wide, deep, and projecting; the fore-legs are short, the back straight, and not very long, the “barrel” full. The ease with which oxen of this breed are fattened is one of its great recommendations. The beef is also of excellent quality. For dairy purposes, the *Short-horn* is surpassed by some other-breeds; but a cross between a *Short-horn* bull and an *Ayrshire* cow is found useful both for beef and milk. The *Short-horn* breed is now cherished in Britain with peculiar care; genealogies are registered, and prodigious prices are given for first-rate animals. It is also in great esteem in many parts of the continent of Europe, and in America.—The *Long-horn* breed, long prevalent in the midland countries of England, and still prevalent in Ireland, was brought to great perfection by Bakewell, one of the first to shew what could be done in the improvement of cattle; but is rapidly giving place to the *Short-horn*, by which it is much excelled. The length of the horns in this breed is very remarkable.

Of foreign races of oxen, one of the most notable, on account of its large size, is that in possession of the Kalmuck Tartars; another is that prevalent in the Ruman states, generally of a bluish-ash color, with remarkably large and spreading horns. A large white breed was long kept in Egypt; and a similar breed, without the hump characteristic of the Indian Ox, is found in South Africa, where, however, it has become partially intermixed with European breeds. Oxen are much employed by the Kaffirs as beasts of burden; they were also formerly trained by the Hottentots to aid them in battle. Peter Kolben, in his account of the Cape of Good Hope, written in 1706, gives an interesting description of these trained fighting oxen, which, he says, are called *Backeleyers*. “In the wars of the Hottentots with one another,” he says, “these backeleyers make very terrible impressions. They gore, and kick, and trample to death with incredible fury.” He ascribes to them also great docility, and states that they know every inhabitant of the kraal, and are perfectly inoffensive towards them, but ready to run with fury at strangers. The readiness with which the draught oxen of South Africa observe the words of the driver, is said to be almost, if not quite, equal to that of the dog. In the training of them, however, severe measures are often requisite, and particularly by a



hooked stick inserted through the cartilage which separates the nostrils, as bulls are ringed when sent to exhibitions of cattle in Britain. Trained oxen are also employed in the training of their younger fellows. In some parts of Africa the ox is used for riding as well as for draught. The horns, which are very long, are split into ribbons, or curved in various directions, to prevent their points from coming in contact, by any accident, with the person of the rider. The pace of the ox scarcely exceeds four or five miles an hour.

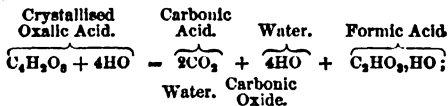
A very remarkable conformation of skull occurs in some of the herds of South American oxen, the bones of the nose and the jaw-bones being very much shortened; yet there is no question that this is a mere accidental variation, which has become perpetuated as one of race. Importance has been attached to it in the discussions regarding species.

The cow has been for ages tended by man on account of the agreeable and highly nutritious fluid which is obtained from it. Milk is manufactured into cheese and butter, which are capable of being preserved for a considerable time. The processes by which these are obtained are described under the article DAIRY. Cows, under our modern systems of agriculture, are selected either for their properties of giving large quantities of milk, or for raising stock which are well suited for grazing and fattening. For milking properties, the Ayrshire breed stands undoubtedly at the head of the list. In comparison with some of the other breeds, the Ayrshire is rather deficient in size, with the flesh spread thinly over its body. In the male animals these characteristics are all the more prominent, and for this reason the breed is not much liked by graziers. It is capable, however, of thriving on secondary or even inferior pastures. Wherever, therefore, it is found most profitable to follow dairy husbandry in Scotland, the Ayrshire cow is preferred. A considerable variety of breeds are cultivated both for milking and grazing in the western parts of England, the principal of which are the Herefords and Devons. In the eastern counties, again, where arable culture and the rearing and feeding of cattle are chiefly followed, the Ayrshire gives place to the Aberdeen, the Angus, and the Teeswater. The cow is there selected for its massive and square-built frame, soft skin, and meat-producing qualities. For more than a century vast care has been bestowed on the improvement of the short-horns. In this breed the pedigrees of the sire and the dam are traced back for many generations, and purity of blood is quite essential in herds of any pretensions. The large sums which particular cows and bulls of this breed realise, attest the value which modern breeders set upon animals which are considered to approach perfection in their form and style. In no department of British agriculture are the results of care and attention more strongly marked than in the noble figure of the short-horned cow or bull.

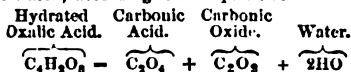
The rearing and fattening of the ox is one of the most important branches of agriculture. Since the prices of butcher-meat have become so much higher relatively to corn in this country, the breeding and feeding of cattle have received a great impetus. Fifty years ago, many of our old breeds of cattle were kept till they were four or five years old before they were sent fat to the butcher. The demand for meat was so limited then in the north, that most of the cattle were sent south lean, to be fattened on the pastures and turnips of the eastern counties of England. The introduction of steam-shipping, followed by railways, has given the Scotch breeder and feeder great facilities for disposing of fatted cattle, and now there are no lean cattle sent to the south. Indeed, the extension of green crops in Scotland has been so great, that large numbers of lean cattle are imported from England, as well as Ireland, to be fed in the stalls and courts during winter. This applies to the arable districts, where the land does not remain more than one year in grass. In Aberdeenshire, where the land rests from three to four years in grass, more cattle are bred and turned out fat, which is by far the most profitable system. Seeing the breeder often gets a larger share of the profits than the feeder. The short-horned blood is in great request to cross with the native breeds, rendering the progeny much easier fattened, as well as causing them to grow to a larger size. It is now the most approved method to feed the calf from the time it is dropped till it is sent to the butcher. Oil-cake is generally considered the best and most healthy auxiliary food for stock, whether old or young. In the pastoral districts of England, where little of the land is cultivated, the rearing of cattle to be sent into the arable districts is carried out. The young animals are fed with hay in winter instead of straw and turnips. Large

numbers of cattle are fattened on turnips and mangold in winter in Norfolk and eastern counties. Large allowances of cake and corn are there given in addition to the roots.

**OXALIC ACID** ( $C_4O_6, 2HO + 4Aq$ ) occurs in colorless, transparent, oblique, rhombic prisms, which have an intensely sour taste, and are soluble in nine parts of cold water, and much more freely in boiling water. When heated to  $212^\circ$ , the crystals lose their four equivalents (or 28.5 per cent.) of water, and the residue, consisting of the hydrated acid ( $C_4O_6, 2HO$ ), becomes opaque; these two equivalents of water contained in the hydrated acid, cannot be expelled by mere heat, although they can be displaced by an equivalent amount of a metallic oxide. When the crystallised acid is rapidly heated to about  $800^\circ$ , it is decomposed into a final mixture of carbonic acid, carbonic oxide, and water; formic acid being produced and again decomposed in the process.



and formic acid when heated yields  $2HO + 2CO$ . When warmed with strong sulphuric acid, it is decomposed into equal volumes of carbonic acid, and carbonic oxide gases, and into water; according to the equation:



This reaction affords one of the best means of obtaining carbonic oxide for use in the laboratory. Oxidising agents, such as binoxide of manganese, peroxide of lead, nitric acid, &c., convert oxalic into carbonic acid, and on this property is based a good method of determining the commercial value of the black oxide of manganese.

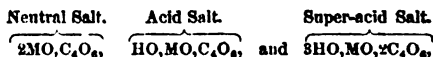
Oxalic acid is one of the most powerful of the organic acids, and expels carbonic acid and many other acids from their salts. The acid itself, and its soluble salts are poisonous. This acid is very widely diffused throughout the vegetable kingdom. Sometimes it occurs in a free state (as in *Boletus sulphureus*), but much more frequently as a salt, either of potash, as in the different species of *Oxalis* (from which genus the acid was originally obtained and derives its name), and of *Rumex*; or of soda, as in various species of *Salicornia* and *Salnola*; or of lime, as in *Rhubarb* and many *Lichens*. In the animal kingdom, it never occurs except in minute quantity and in combination with lime. Oxalate of lime is found in a crystalline shape, both in healthy and morbid urine. In the latter, it constitutes the leading symptom of the affection termed **OXALURIA** (q. v.), while in the former it occurs after the use of wines and beer containing much carbonic acid, of sorrel, rhubarb-stalks, &c., and after the administration of the alkaline bicarbonates. It is the constituent of the urinary calculus, known from its rough exterior as the mulberry calculus. Crystals of oxalate of lime have also been found in the mucus of the gall-bladder, on the mucous membrane of the impregnated uterus, and in morbid blood. They have likewise been detected in the biliary vessels and excrements of caterpillars. In the mineral kingdom these crystals have been detected in association with crystals of calcareous spar.

Oxalic acid is produced by the action of either hydrate of potash or of nitric acid upon most organic compounds of natural occurrence. Its most common mode of preparation is by the oxidation of starch or sugar by nitric acid. The organic compound and the nitric acid are heated in a flask till all effervescence has ceased, after which the solution is evaporated, and the oxalic acid separates in crystals on cooling.

This acid forms three series of salts, viz., neutral, acid, and super-acid, which, if **M** represents the metal entering into the salt, may be represented by the formulae:

Oxalides  
Oxaluria

936



the last being a compound of the acid salt and the acid. Oxalate of lime ( $3\text{CaO}, \text{C}_4\text{O}_6 + 4\text{Aq}$ ) and ordinary (neutral) oxalate of ammonia ( $2\text{NH}_4\text{O}, \text{C}_4\text{O}_6 + 2\text{Aq}$ ) are examples of the first; binoxalate of potash, or salt of sorrel ( $\text{KO}, \text{HO}, \text{C}_4\text{O}_6 + 2\text{Aq}$ ) is an example of the second; while the salt usually termed quadroxalate of potash ( $\text{KO}, 3\text{HO}, 2\text{C}_4\text{O}_6 + 4\text{Aq}$ ) is an example of the third class. Of the numerous oxalates, the most important are the oxalate of lime (in consequence of its physiological and pathological relations); the neutral oxalate of ammonia, which is the best test for the detection of lime in solution (in consequence of the extreme insolubility of the resulting oxalate of lime); and the acid oxalate of potash, which is contained in the juices of *oxalis* and *rumex*, and is employed in various manufacturing processes.

The best test for this acid is the production of a white precipitate (of oxalate of lime), on the addition of any soluble salt of calcium. The precipitate is insoluble in water, in solution of potash, and in acetic acid, but dissolves in the mineral acids. A solution of nitrate of silver also gives a white precipitate of oxalate of silver, which explodes when heated.

In consequence of its employment in cotton printing, bleaching straw, &c., oxalic acid is more accessible to the general public than many other poisons; and on this account instances of suicide from the swallowing of this acid are by no means uncommon. Cases of accidental poisoning, moreover, sometimes occur by its being sold by mistake for Epsom salts. Large doses destroy life very rapidly. Dr A. Taylor mentions a case in which a man died in 20 minutes after taking two ounces of the acid. Dr Christison records a case in which an ounce killed a girl in 30 minutes, and another case in which the same quantity destroyed life in ten minutes; and, as a general rule (liable to exceptions), when the dose is half an ounce or upwards, death commonly takes place within the hour. The symptoms are a hot or burning acid taste, with a sense of constriction or suffocation; vomiting, great pain in the region of the stomach, convulsions, cold perspirations and general collapse speedily follow; and respiration shortly before death becomes slow and spasmodic. With the view of converting the free acid in the stomach into an insoluble and inert salt, chalk, whiting, or lime-water, with full draughts of milk, should be administered with the least possible delay. Salt of sorrel is almost as poisonous as the pure acid.

**OXALIDEÆ**, or Oxalidaceæ, a natural order of exogenous plants, allied to *Geraniaceæ*; including herbaceous plants, shrubs, and trees; with generally compound alternate leaves; calyx of five equal persistent sepals; corolla of five equal unguiculate petals, spirally twisted in bud; ten stamens, usually more or less united by the filaments, in two rows; the ovary usually 5-celled, with five styles; the fruit a capsule opening by as many or twice as many valves as it has cells, or more rarely a berry; the seeds few, attached to the axis. There are upwards of 300 known species, natives of warm and temperate climates. They are particularly abundant in North America and at the Cape of Good Hope. The flora of Britain includes only two small species of *Oxalis*. An acid juice is very characteristic of this order. Some of the tropical species produce agreeable acid fruits, as the *Carambola* (q. v.).—The genus *Oxalis* has a capsular fruit, and the seeds have an elastic integument, which at last bursts open and projects the seed to a distance. The species are mostly herbaceous plants with ternate or digitate—rarely simple or pinnate—leaves; a few are shrubs. The stems and leaves generally contain a notable quantity of *Binoxalate of Potash*, and have therefore a sour taste.—The **COMMON WOOD-SORREL** (*O. acetosella*), very abundant in shady woods and groves in Britain and most parts of Europe, a native also of North America, is a beautiful little plant, often covering the ground with its green leaves, amidst which the white or slightly roseate flowers appear. Its leaves all grow from the root, a long leaf-stalk bearing three obovate leaflets; the scape bears a single flower. There is a subterranean scaly root-stock. On account of their grateful acid taste, the leaves are used in salads and sauces. The plant is extremely abundant in Lapland, and is much used by the Laplanders. It is antiscorbutic and refrigerant, and an infusion of it is a grateful drink in fevers. *Binoxalate of potash* is obtained from the leaves by

expressing the juice, and crystallising, and is sold not only under the name of *Salt of Sorrel*, but also of *Essential Salt of Lemons*, and is used for extracting spots, and particularly iron-marks, from linen, and for other purposes. Much of it is now, however, obtained from a very different source. See OXALIC ACID.—*O. corniculata*, rare in Britain, and almost confined to the south of England, but a plant of very extensive distribution, being found in Europe, North America, India, Japan, and some of the African Islands, has a branched stem, with decumbent branches, leaves very similar to those of the common wood-sorrel, and yellow flowers. Its properties agree with those of the common wood-sorrel. Many other species much resemble these in their general appearance and properties. Some of the species exhibit an irritability like that of the Sensitive Plant; generally, as in the two British species, in a slight degree, and notably only in hot sunshine; but *O. sensitiva*, an East Indian species, with pinnate leaves, possesses this property in a high degree. Some species of *Oxalis*, as *O. cornua*, a native of South Africa, are remarkable for producing large bulbils in the axils of the lower leaves. Several species have tuberous roots, and are cultivated on account of their tubers; as *O. crenata* and *O. tuberosa*, natives of Peru and Bolivia, where they are much esteemed, and both receive the name Oca. The tubers, when cooked, become nicely like potatoes. They have a slightly acid taste. *O. crenata* has been cultivated in gardens in Britain for about thirty years, but continues to be almost exclusively an object of curiosity, being too tender for the climate, and its produce very inconsiderable in quantity. Its tubers are yellow in size, and shape like small potatoes. The succulent stalks of the leaves abound in a pleasant acid juice, and make excellent tarts and preserves. *O. tuberosa* produces numerous small tubers. The Bolivians often expose them for a long time to the sun, by which they lose their acidity, become saccharine, and acquire a taste and consistence like dried figs. *O. Deppet* is a Mexican species, with a root somewhat like a small parsnip, quite free of acidity. It is much cultivated in its native country, and succeeds well in the southern parts of England. *O. tetraphylla* and *O. crassicaulis*, natives of Mexico, and *O. enneaphylla*, a native of the Falkland Islands, also have eatable roots. Many species of *Oxalis* are much esteemed as ornaments of gardens and green-houses.

OXALURIA, or The Oxalic Acid Diathesis, is a morbid condition of the system, in which one of the most prominent symptoms is the persistent occurrence of crystals of oxalate of lime in the urine. These crystals most commonly occur as very minute transparent octohedra, but sometimes in the form of dumb-bells; in order to detect them, the urine, which usually in these cases presents a mucous cloud, should be allowed to stand for some hours in a conical glass, and after the crystals have gradually subsided, the greater part of the fluid should be poured away, and the drops remaining at the bottom examined with a power of not less than 200 diameters. These crystals, which are insoluble in acetic acid, may occur either in acid or in alkaline urine. Persons who secrete this form of urine are usually dyspeptic, hypochondriacal, and liable to attacks of boils, cutaneous eruptions, and neuralgia. The oxalic acid, in these cases, is not introduced into the system with the food, but is a product of the disintegration of the tissues, and is due to the imperfect oxidation of compounds, which should normally have been converted into carbonic acid. (Anhydrous oxalic acid,  $C_2O_4$ , obviously requires 2 equivalents of oxygen to be converted into carbonic acid,  $C_2O_2$ , or  $4CO_2$ . Hence, if these two equivalents of oxygen are wanting in the system in consequence of imperfect oxygenation of the blood, oxalic acid, in combination with lime, appears as a final excretion in place of carbonic acid.) The occurrence of oxalic acid as a persistent sediment in the urine, is not only an indication of an existing morbid condition of the system, but may give rise to two perfectly distinct dangerous complications; (1) a concretion of oxalate of lime (mulberry calculus) may be formed either in the kidney or the bladder; and (2) bad consequences may arise from the poisonous action of the oxalic acid on the digestive organs, on the heart, and on the nervous system.

The treatment is simple. Care must be taken that the patient should avoid articles of diet containing oxalic acid (such as sorrel, rhubarb, tomatoes, &c.), or readily converted into it (such as sugar), and all drinks containing much carbonic acid; while he should take plenty of exercise in the open air, without fatiguing himself; should use the shower-bath, unless he feels chilled and depressed after its application, in which case he should rub the body all over daily with a horse-hair

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glove; and should employ as a tonic medicine either a true nitro-muriatic acid in a bitter infusion (30 minims of the acid in an ounce and a half of infusion of Chyretia), or five grains of citrate of iron and quinine three times daily. Under this treatment, the oxalates usually almost entirely disappear from the urine in two or three weeks.

**OXENSTIERNA**, Axel, Count, an illustrious Swedish statesman, was born at Fano, in Uppland, 16th June 1583. He was originally educated for the church, and studied theology as well as jurisprudence at Rostock, Jena, and Wittenberg, in the last of which universities he took his degree. Although he afterwards devoted himself to public affairs, he continued all his life to take a deep personal interest in religious questions, and labored zealously for the extension of the Protestant doctrine. After leaving the university, he visited most of the German courts, but returned to Sweden in 1603, and soon afterwards entered the service of Charles IX., who, in 1606, despatched him as ambassador to the court of Mecklenburg. He became a senator in 1606—a dignity which had been enjoyed by thirteen of his predecessors in uninterrupted succession. Having displayed great prudence and wisdom in the settlement of certain disputes between the Livonian nobles and the town of Reval, he was appointed by Charles—now infirm from age—guardian of the royal family, and head of the regency. On the accession of Gustavus Adolphus (q. v.), in 1611, O. was made chancellor; and in 1618, acted as minister-plenipotentiary in the negotiations for peace between Sweden and Denmark. In the following year he accompanied his sovereign to Poland, and by the peace of Stolbova, in 1617, terminated hostilities between Sweden and Russia. His political sagacity was not less conspicuously shewn in his successful efforts to prevent Gustavus from marrying Eoba Brahe, a Swedish beauty, and in bringing about a match between his master and the Princess Maria-Elisabeth of Brandenburg. In 1621, on the departure of the king for the Polish war, he was charged with the administration of affairs at home, which he conducted with his invariable felicity; subsequently, he was appointed governor-general of the conquered districts; and in 1629, concluded peace with the Poles on highly favorable conditions. For a while O. strongly opposed the desire of Gustavus to take part in the "Thirty Years' War," his hope being to see the latter arbiter of the north of Europe; but when he found that the Protestant sympathies of the king were irrepresible, he set about collecting money and troops for the perilous enterprise, with all the quiet but wonderful activity and persistency that so remarkably characterised him. After Gustavus had fairly entered on the bloody struggle, O. joined him, and conducted most of the extensive and complicated diplomacy which the course of events entailed on Sweden. The death of Gustavus for a moment paralysed him, but he instantly recovered, and heroically resolved to continue the contest with the imperialists, in spite of the visible disaffection of many of the German Protestant princes, among others, of the Elector of Saxony. The will of the dead monarch was sent to Stockholm; according to its conditions, the government—during the minority of Christina (q. v.)—was intrusted to five nobles, who empowered the chancellor to prosecute the war. His difficulties were enormous, yet by indefatigable efforts he managed partly to allay the discontents, jealousies, and rivalries of the Protestant leaders. The disastrous defeat of the Swedes at Nordlingen in 1634, and the perplexities which followed it, would have stupified most men in the position of O., but it only called out more energetically his splendid diplomatic genius. Transferring the leadership of the Protestant forces to Duke Bernhard (q. v.) of Weimar, he proceeded, in 1635, to France and Holland, and formed alliances with these countries. Returning to Germany, he assisted in quelling a mutiny among the Swedish troops at Magdeburg; put Pomerania in a state of defence, to resist the meditated attack of the Elector of Brandenburg; renewed the treaty with Poland; and leaving Baner in command of the Swedes, returned to Stockholm in 1636, where he was received with the liveliest enthusiasm. He still continued, however, to direct ably the policy of the Protestants in Germany, till the peace of Westphalia, in 1648, put an end to the war. O.'s son was one of the Swedish envoys who signed the treaty, and it is in a letter to him that the famous sentence of the statesman occurs, *Nescis, mi fili, quantilla prudentia homines regantur*—"You do not yet know, my son, with how little wisdom men are governed"). Christina, who had been declared of age in 1644, did not shew a proper respect for the advice of O.; and after she had—through mere feminine

willfulness—abdicated in spite of all his protestations, he withdrew from public life, and died 28th August 1654, shortly after she had left Sweden. He entertained a genuine affection for the daughter of his noble master, and in his last moments her name was upon his lips. Some treatises and historical fragments are attributed to him, and his "Journal" has been published in the "Stockholm Magazine." See Landblad's "Svensk Plutarch" (2 vols. Stock. 1824); Fryxell's "History of Gustavus Adolphus;" and Geijer's "History of Sweden."

**OX-EYE.** See **CHRYSANTHEMUM.**

**OXFORD**, an ancient and famous city and seat of learning in England, the chief town of the county of Oxford, is situated on the north-east bank of the Isis, a tributary of the Thames, a little above the point where it is met by the Cherwell. Both streams are crossed by numerous bridges, of which the finest are Folly Bridge over the Isis, and Magdalen Bridge over the Cherwell. Lat. of the city,  $51^{\circ} 45' 55''$  n., long.  $1^{\circ} 15' 29''$  w. Distance from Loudon, 55 miles west-north-west. Pop. (1871) 34,492. O. occupies an undulating site, is surrounded by rich and wooded meadows, and presents to the eye of the approaching visitor a scene of unequalled architectural magnificence—spires, and towers and domes rising as thickly as chimney-stalks in the manufacturing towns of Lancashire or Yorkshire. The four main streets of O. meet at right angles near the centre of the town, at a place still called Carfax, a corruption of *Quatre voies*, and which appears in Agas's map (*temp.* Elizabeth) as *Cater ways*. These are—Cornmarket Street, leading into St Giles's, and running due north; Queen Street, leading to the railway-stations, and running west; St Aldate's Street, leading to the Isis, and running due south; and High Street, which is the chief street of the city, gracefully curving in an easterly direction, and conducting to the river Cherwell, a smaller river joining the Isis soon after it has passed Oxford.

The western half of the town is the most uninteresting; and it is a misfortune that the railway-stations are placed here, as travellers, on arriving, are introduced to the meanest parts of the city first. The county courts and jail, and the remains of the castle, from which the Empress Maud escaped while it was besieged by King Stephen, will be observed in passing. There is one good street in this part—viz., Beaumont Street, built on the site of the ancient Beaumont Palace, in which Richard I. was born. At the end of this street is Worcester College. Passing to the north from Carfax, along the Cornmarket, the old tower of St Michael's Church is seen, against which stood formerly the north gate of the city; next St Mary Magdalen Church; then the Martyr's Memorial, with the Taylor Buildings and Randolph Hold on the left, and part of Balliol College and St John's College on the right. St Giles's Church is at the north end of this street, which is very wide, and has a row of elm-trees on each side, forming a picturesque avenue like a foreign *boulevard*. Beyond this, to the north, is the Radcliffe Observatory and Infirmary. The High Street is about 1000 yards in length; it is reckoned one of the noblest streets—architecturally considered—in Europe, and contains, among other edifices, part of the buildings of Magdalen College, Queen's College, All-Souls' College, University College, and St Mary's and All-Saints' Churches. Parallel to it is Broad Street, in which are situated Balliol, Trinity, and Exeter Colleges, the Ashmolean Museum, the Clarendon Rooms, the Sheldonian Theatre, and close by are the Academical Schools, the Bodleian Library, and the Picture Gallery. In St Aldate's Street, which forms the southern part of the series of streets already mentioned as forming one line, and running north and south, is Christ Church College (the entrance tower of which contains the great bell "Tom of Oxford," weighing upwards of 11,000 lbs.) and St Aldate's Church. The other colleges and important buildings connected with the University of O. lie back from the principal streets. To attempt particularising the architectural characteristics of each of these edifices is impossible within our limits. It may suffice to say, that though there is nothing extraordinarily fine about the architecture of the colleges, regarded individually, yet the vast number of the structures and variety of styles present a *total ensemble* that is altogether sublime. The effect is wonderfully heightened by the interposition of gardens, meadows, and venerable trees—old as the buildings that tower above them. Christ Church is celebrated for its magnificent hall, picture gallery, and library, as well as for its extensive grounds; its chapel, the cathedral church of O., is Norman in style, but is inferior, both in size and beauty, to most English cathedrals. Mer-

ton College is situated a little to the south of the High Street, and still retains the original chapel and part of the other buildings erected by Walter de Merton in the 13th century. Magdalen College retains its celebrated cloister and tower of the 15th c., and the buildings here are the most complete of any college in Oxford. Oriel College, a comparatively modern structure, is very picturesque, but far from chaste in its design; New College ranks among the noblest buildings in the city—"the chapel, the hall, the cloisters, the groined gateways, and even some original doors and windows remain, in their exterior at least, as they came from the hand of their master architect," William of Wykeham, 500 years ago; Queen's College is built in the Grecian style of architecture, with a spacious and handsome chapel and a fine library; so is Trinity College; University College is a not unpleasant mixture of Gothic and Italian; Exeter College has a splendid frontage on the west, and its chapel (built 1857-1858), in the Gothic style, is the finest modern building in the city; it has also an excellent hall, and a beautiful library; Balliol College has a remarkably fine chapel, built only a few years ago. Among the other churches in O., besides the cathedral church and the college chapels, are—St Mary's, which is attended by the members of the university; St Martin's, the church of the corporation of O.; St Peter's-in-the-East, with a Norman crypt; St Michael's, with a Saxon tower; and St Aldate's. The chief buildings connected with the university, besides the Bodleian and the Ashmolean Museum already mentioned, are the Radcliffe Library, a circular structure, adorned with Corinthian columns and surmounted by a dome; the Radcliffe Observatory, crowned by an octagonal tower, in imitation of the Temple of the Winds at Athens; the University Printing-Office, and the T aylor Institution, founded "for the teaching the European languages," an exceedingly handsome and extensive range of buildings. The Botanic Gardens are situated not far from the Cherwell, and nearly opposite Magdalen College. Other notable buildings, not connected with the university, are—the Town Hall, the Radcliffe Infirmary, the County Gaol, and one or two dissenting places of worship, such as the Wesleyan Chapel in New Inn Hall Lane, and the Independent Chapel in George Lane.—The city of O. is a mart for the disposal of the agricultural produce of the neighboring country, but has little trade of its own, and is dependent for its prosperity chiefly on the university. It is a municipal and parliamentary borough, and governed by a mayor, nine aldermen, and thirty councillors, whose jurisdiction, however, does not embrace the university. Both the city and the university send two members to parliament.

O., by the Saxons called Oxenaford, and in the "Domesday Book," Oxenecford (probably from its having been originally a ford for the passage of oxen), is a place of great antiquity. The date of its origin is unknown, but as early as the 8th c. there was a nunnery established here; and in 802, an act of confirmation by Pope Martin II. describes it as an ancient seat of learning. It is said to have been a residence of King Alfred, and also of Caute, who held several parliaments within its walls. The townsmen closed their gates against William the Conqueror, who stormed the town in 1067, and gave it to one of his followers, Robert d'Oyley, who built a castle here to overawe the disaffected Saxons, some ruins of which are still to be seen. The pacton that terminated the strife between Stephen and Henry II. was drawn up at Oxford. In the reign of Edward III., the preaching of Wickliffe excited great commotion among the students, and threatened well-nigh the dissolution of the university. In the reign of the "Bloody Mary," it witnessed the martyrdoms of Ridley, Latimer, and Cranmer; and during the great civil war of the 17th c., it was for a while the head-quarters of the Royalist forces, and was conspicuous for its adherence to Charles I. Ever since that period the city—or, at any rate, the university—has been in general characterised by an extreme devotion to the "church" and the "king."

OXFORD UNIVERSITY is said to have been founded by King Alfred. Without claiming for it an origin quite so ancient, it is certain that from very early times students resorted to Oxford in order to attend lectures there delivered by learned men, and that they lived in the houses of the townspeople. In some cases they combined together, so as to secure the service of a common teacher, with whom they lived in a large tenement called an inn, hostel, or hall. For a long time, however, the great majority of the students lodged in rooms hired from the citizens; and as late as the year 1512, regulations were made for the governance of such students.

As their numbers increased, the halls were multiplied. Anthony Wood states that he could shew the names and places of more than a hundred. A great diminution in the numbers of the students took place about the middle of the 15th century. This, among other causes, led to the gradual disappearance of the halls, which were bought up by the wealthier colleges. Only five of the halls now exist, which differ from the colleges only in that they are unincorporated, and have little or no endowments. Residence in private lodgings had also fallen into disuse; and by the time of Queen Elizabeth, it had become a compulsory rule that all undergraduates should reside in some college or hall, at least for the first twelve terms of residence. Now, however, undergraduates may in most colleges live in lodgings from the beginning of their course.

The colleges were founded at various periods, from the end of the 13th c. to the beginning of the 18th. Fourteen out of the 20 were founded before the Reformation. Their object originally was to support limited societies of students, who were to devote their lives to study—by no means, as at present, to educate large classes of the community. Students, other than those on the foundation, seem not to have been regarded by the founders as an essential part of the college. The colleges arose, as has been already said, partly instead of the old halls, and were partly at first connected with the monasteries, it being by means of these institutions that benevolent persons were enabled to give permanent support to poor secular scholars. University and Balliol, which now rank as the oldest colleges, were in point of fact halls supported by endowments held in trust for the maintenance of their students. The originator of the collegiate system, in anything like its present form, was Walter de Merton, who, besides having founded Merton College, is entitled to the honor of having mainly contributed to fix the university in its present site. All those on the foundation of the colleges before the Reformation were called Clerici. The great majority of the fellows were required to take priest's orders within a certain period after their election. This requirement of course involved celibacy, which, besides, was expressly imposed in some colleges; and practically, in old times as now, was enforced by the rule of life and the obligation of residence. Within the last few years, in some of the colleges the restriction of celibacy has been, under certain conditions, remitted in the case of fellows engaged in college work.

Under a statute passed in 1663, any person may now become a member of the university, without becoming a member of a college or hall, provided he satisfies certain disciplinary requirements. For such purposes these unattached students are under the control of a board of delegates; but no special provision is made for their instruction. In 1871, the new foundation of Keble College, built in memory of John Keble, was admitted to enjoy the same privileges (save as regards the academic status of its head) as are possessed by the existing colleges and halls.

Previous to the statute 17 and 18 Vict. c. 81, the constitution of the university was as follows: 1. The Hebdomadal Board, or Weekly Meeting, consisting of the Heads of Houses and the two Proctors, which body exercised the chief share of the administration of the university, and possessed the exclusive power of initiating legislation; 2. Congregation, consisting of certain university dignitaries, which met merely for the purpose of conferring degrees; 3. Convocation, consisting of all Masters of Arts, a body whose consent was necessary before any of the measures proposed by the Hebdomadal Board could become law, which elected the chancellor, the two representatives of the university in parliament, several of the professors, and dispensed the ecclesiastical patronage of the university. The statute referred to introduced important changes. The Hebdomadal Board has been changed into the Hebdomadal Council, consisting of the chancellor, the vice-chancellor, the proctors, six heads of houses, six professors, and six members of convocation of not less than five years' standing—such heads, professors, and members of convocation being elected by congregation, and holding office for six years. Congregation, again, now consists of all the great officers of the university, the professors, the public examiners, and all resident masters; and on this body is now bestowed the power of accepting or rejecting and of amending any statute framed by the Hebdomadal Council. The composition and powers of Convocation remain unchanged. The students not on the foundation are for the most part commoners. In Worcester College and the halls there is still a class of fellow-commoners, who pay larger fees, and enjoy certain privileges. They mainly consist of men above the ordinary age of undergraduates,



who wish to have the intellectual advantages of the university without being subjected to the common routine of discipline. All other formal distinctions due to wealth or poverty are almost entirely abolished; such as the special privileges of peers, and the regard had to the poverty of candidates in the case of certain scholarships. It is very difficult to ascertain the actual number of students at any one time in Oxford, but now it is probably seldom above 1600.

There are four terms in each year—viz., Michaelmas Term, which begins on the 10th of October and ends on the 17th of December; Hilary Term, which begins on the 14th of January and ends the day before Palm Sunday; Easter Term, which begins on the Wednesday in Easter-week, and ends on the Friday before Whitsunday; Trinity Term, which begins on the Saturday before Whitsunday and ends on the Saturday after the first Tuesday in July. Full Term, as it is called, does not begin till the first day of the week after the first congregation is held. By undergraduates, Michaelmas and Hilary Terms are kept by six weeks' residence, and Easter and Trinity Terms by three weeks each; but more than this is required by most of the colleges. Twenty-six weeks may be taken as the ordinary length of the *academical year*. Twelve terms of residence are required for the degree of B.A. from all. The degree of M.A. is obtainable in the twenty-seventh term after matriculation. By a statute passed in 1850, the following examinations were made necessary for a degree in arts; but their nature has been considerably changed by the new statutes which come into effect 1873–1874: 1. Responsions, called "Little Go" or "Smalls" in the familiar language of undergraduates, are obligatory upon all. The university does not, as to this or any other pass examination, fix a limit of time within which they must be passed; but most colleges require their members to pass responsions, at least within their first year of study. Subjects: one Latin and one Greek author—or portions of them, as five books of Homer, five of Virgil, two Greek plays, &c.—with a paper of grammatical questions; a piece of English to be translated into Latin; two books of Euclid, or algebra up to simple equations inclusive; and arithmetic. 2. The First Public Examination, or Moderations, is also obligatory upon all. Candidates must have entered upon their fourth term. Subjects: the Four Gospels in Greek (except in the case of persons not members of the Church of England, when some one Greek author is to be substituted); one Greek and one Latin author; not the same as those offered for responsions, and one must be a poet, the other an orator; a piece of English into Latin, and a paper of grammatical questions; logic, or Euclid III. and IV., 1–9, and algebra. Honors are awarded at this examination both in classics and pure mathematics. Candidates are recommended to take up especially poets and orators. Verses, as well as Greek and Latin prose-writing, and a paper of grammatical and philological questions, are set. In the mathematical school, which in this examination exists as a separate school for honors only, candidates are examined in pure mathematics up to the Integral Calculus and the Calculus of Finite Differences inclusive. 3. The Second Public Examination held twice a year, to be passed not earlier than the 12th term, and for honors not later than the 16th term of standing; unless the candidate has been classed in some other school of the Second Public Examination, in which case he may be admitted up to the 20th term inclusive. This examination consists of three parts: (1.) an examination in the rudiments of faith and religion, or in the case of those who (or whose guardians) object to such examination, certain substituted books or subjects; (2.) an examination of those who do not seek honors; and (3.) an examination for those who do seek honors. In this last there are, in Oxford phraseology, six schools: Literæ Humaniores, Mathematics, Natural Science, Jurisprudence, Modern History, Theology. Candidates are entitled to a degree of B.A. who, having passed the two previous examinations, also passed the examination appointed for those who do not seek honors, or who obtain honors in any one of the six honor-schools. But every candidate, except he has obtained honors in the Theology School, must have satisfied in the rudiments of faith and religion or the substitute. By these rudiments are understood the Old and New Testaments (Gospels and Acts of the Apostles in the original Greek); and the 39 articles. The pass examination embraces subjects chosen from at least two out of the three following groups: (a) Greek and Roman history and philosophy; (b) English, modern languages, political economy, and law; (c) geometry, mechanics, chemistry, and physics. Out of these the candidates must select three subjects, one of which must be either (1) ancient

philosophy and history (in the original Greek, or Greek and Latin); or (2) a modern language (French or German). The classical books must be other than those offered for Responsions and Moderations. Candidates for honors may select any one, or more than one of the six schools. The most popular and influential of these is the school of *Litteræ Humaniores*. The examination in this school includes (1) the Greek and Latin languages; (2) the histories of ancient Greece and Rome; (3) logic and the outlines of moral and political philosophy. Candidates may also offer certain special subjects in any of these three departments. The republic of Plato and the ethics of Aristotle form the basis for philosophical study, though they are every year more largely supplemented by modern philosophy. Next in the numbers of its candidates is the school of Modern History, which includes (1) the continuous history of England; (2) general history during some period, selected by the candidate, from periods to be named from time to time by the Board of Studies; (3) a special portion of history, or a special historical subject, carefully studied with reference to original authorities. The School of Jurisprudence includes (1) general jurisprudence; (2) the history of English law; (3) some department of Roman, and it may be, of English law; (4) international law, or a specified department of it. The School of Mathematics embraces pure and mixed mathematics (algebra, trigonometry, calculus, mechanics, optics, astronomy). The School of Natural Science has a double examination for honors—a preliminary and a final. The preliminary examination, incumbent upon all, is restricted to the elementary parts of mechanics, physics, and chemistry. In the final examination, the candidate may offer himself for examination in one or more of the three general subjects of physics, chemistry, and biology. The examination in the Honor School of Theology includes the Holy Scriptures, dogmatic and symbolic theology, ecclesiastical history and the fathers, the evidences of religion, liturgies, sacred criticism, and the archaeology of the Old and New Testaments. A knowledge of Hebrew will have weight in the distribution of honors. The organisation of these schools is at present the main function of the university, as distinct from the colleges. Professorial teaching on its own account only exists to a very limited extent. In the main, the teaching power of the colleges is devoted to preparing their undergraduate members for these various examinations.

Examinations also take place for degrees in law, medicine, divinity, and music; but these are in great measure formal. The examinations for degrees in arts are the proper work of the university.

Besides these honors, various distinctions are conferred by the university. There are several university scholarships, more particularly the Vinerian law fellowships and scholarships; the Eldon law scholarship; one Sanscrit and two Hebrew scholarships yearly; two mathematical scholarships; the Hertford scholarship, for the encouragement of the study of Latin, and the Ireland and Craven scholarships, for the encouragement of the study of classics. There is also the Newdigate prize for the best composition in English verse; and the three chancellor's prizes for the best compositions in Latin verse, Latin prose, and English prose; the Galsford prizes for Greek composition; and the Arnold, Stanhope, and Marquis of Lothian's prizes for the best essays on an historical subject. But the great prizes are the scholarships and the fellowships. By the commissioners under 17 and 18 Vict. c. 81, these have been for the most part thrown open, and are now awarded after examination without restrictions as to kin or place of birth. At All-Souls, and also at St John's College, since the labors of the commissioners, an attempt has been made to keep up the former exclusiveness. The scholarships, which are so numerous as to be within the reach of any young man of ability, range from £60 to £80 a year, with rooms free, which would go a considerable way towards defraying the expense of a university education. At the close of this education come the fellowships; and it has been calculated that when the arrangements of the commissioners are complete, there will be between 20 and 30 fellowships, mostly about £300 per annum, open yearly to competition.

Oxford is, of course, chiefly fed from the great English schools. A close connection subsists, by the terms of the foundation, between Winchester and New College, between Westminster and Christ Church, and between Merchant Taylors' and St John's. For the nature of this connection, see under these colleges. A student desirous of going to Oxford, must apply to the Head of the College to which he wishes to belong. Application in former times had to be made early, as all the good

colleges were filled up for several years in advance. But now that undergraduates are allowed by most colleges to live in lodgings from the first, a candidate can have no difficulty in securing admission even to a distinguished college at short notice. There is no *university* examination at matriculation; but all the good colleges have such an examination before they receive any one—the standard of the examination, of course, varying with the college. After being received into the college, the undergraduate is sometimes assigned to a college tutor, who exercises a special control over his reading; but he also attends the instruction of the other college tutors or lecturers, as the course of his studies may require. The cost of tuition varies at different colleges, but an average of £65 may be given as paid by the undergraduate during his whole career. This payment is at some colleges distributed over three, at others over four years. Besides this, almost every undergraduate finds it necessary, at some period, before taking his degree, to read with a private tutor, whom he chooses for himself. Private tuition has grown to be quite an institution in Oxford, though not formally recognised. Many of the ablest young men, after taking their degree, remain in Oxford for a year or two, taking private pupils. In this way, an undergraduate, even of a badly-taught college, could secure the advantages of the best tuition. But during the last few years, the lecturers in different colleges have more and more combined and systematised their work; and thus to a slight extent obviated the need for private tuition. Much discussion has taken place on the merits and faults of this system; but, on the whole, it must be allowed to be useful for the tutor, as clearing up and concentrating his knowledge, while, at least to undergraduates who read for honors (with a few rare exceptions), it may be considered as absolutely necessary. Private tutors usually charge £10 a term for three hours a week. Previous to 1852, the professoriate of Oxford was strictly ornamental. A great effort was then made to stir it into life, which has been partially successful. New professorships were created, and the endowments of old ones were increased by the commissioners, under 17 and 18 Vict., c. 81. But the former of these measures, at least, whatever it may have done for the interests of science, has produced but little effect on the undergraduates. They still limit their range of studies by the requirements of the examinations of the schools, and it were hard to expect them to do otherwise. But professorial teaching has undoubtedly become more popular in the ordinary branches of study. Lectures by the professors of Law and Modern History, of Moral Philosophy, Logic, Greek, and Latin, are felt to be useful, and are therefore well attended. With regard to the expenses of Oxford, it is difficult to say anything very definite. They vary at different colleges, not only indirectly from the tone of the society, but even directly from the charges made for necessities. A man should be exceedingly comfortable at Oxford with £200 a year; on £150, he can manage with economy. Many young men could not with prudence, be exposed to the difficulties of living in Oxford on less than the latter sum. There have indeed been instances of men passing creditably through the university course on £100 a year. The necessary expenses do not exceed that sum; the habits of the young men themselves cause a great part of the expenses. Returns procured by the delegates for unattached students shew that some students cover their board, lodging, and tuition for about £45 a year. Discipline inside the college is maintained by the head of the house and the tutors; in the town and its neighborhood, by the proctors, who are university officers invested with great authority. As a rule, this authority is well exercised. According to the "Universities Commission Report" (1874), the revenue of the colleges and university in 1871 was £413,000.

The following is a list of the colleges and halls as they rank in the university; an account of each will be found in its alphabetical place; University, Balliol, Merton, Exeter, Oriel, Queen's, New College, Lincoln, All Souls, Magdalen, Brasenose, Corpus Christi, Christ Church, Trinity, St John's, Jesus, Wadham, Pembroke, Worcester, Keble, St Mary Hall, St Magdalen Hall, New Inn Hall, St Alban Hall, St Edmund Hall. To these may be added Charsley's Hall, being a private hall under the mastership of W. H. Charsley, in virtue of a statute passed in 1854, empowering any M.A. of a certain standing to open a private hall on his obtaining a licence from the vice-chancellor. The Unattached Students now number upwards of 100; but the present system of university teaching is not very favorable either to their increase or progress.

Among the books which may be consulted with regard to Oxford are—Ayliffe's

"History of Oxford," Wood's "Annals," the "University Calendar," and, above all, the "Report of the Royal Commissioners for 1852."

**OXFORD BLUES.** See HORSE GUARDS, ROYAL.

**OXFORD CLAY**, the principal member of the Middle Oolite series, is a bed of stiff dark-blue or blackish clay, sometimes reaching a thickness of 600 feet. There occur in its lower portion in some places layers of tough calcareous sandstone, called Kelloway Rock, from a place in Wiltshire, where it is quarried. The O. C. lies beneath the plain on which Oxford is built, and extends south-west and north-east from the shore at Weymouth to the fen lands south of the Wash, thence it may be traced through Lincoln into Yorkshire, until it disappears under the sea at Scarborough. The close packing of the fossils in the fine compact clay has caused them to be beautifully preserved; the shells frequently retain their iridescence, and even the softer parts of the cephalopods have sometimes left with tolerably clear definition their form in the clay. The fossils are, however, often filled with iron pyrites, which, on exposure to the atmosphere, readily decomposes and destroys all traces of the beautiful organism. The remains of chambered shells of the genera *belemnites* and *ammonites* are very abundant, and with them are associated other shells, interesting crustacea, and the species of fishes and reptiles which are characteristic of the oolite.

**OXFORDSHIRE**, an inland county of England, bounded on the s. by the river Thames, on the e. by Bucks, and on the w. by Gloucestershire. Area, 472,717 acres. Pop. (1871) 177,975. The surface, where it is not level, is undulating. In the north-west the hills rise in Broom Hill to 636 feet above sea-level, and in the south-east of the county are the Chiltern Hills (q. v.), rising near Nutfeld to 820 feet in height. It is watered along its southern border by the Thames, and the other chief rivers are the Windrush, Evenlode, Cherwell, and Thame, affluents of the Thames. By means of the Oxford Canal, which joins the Thames at Oxford, the towns and districts lower down the river (Abingdon, Wallingford, &c.), are supplied with coal from the Leicestershire coal-fields. The soil is fertile; the state of agriculture is advanced, 414,663 acres being under crops, fallow, or grass, in 1876; and the county may be considered one of the most productive in the country. Three members are returned to the House of Commons for the county.

**OXIDATION** is the term applied to the union of any body with oxygen, the body being then said to be *oxidised*, and the resulting compound being termed an *oxide*. Many bodies possess the property of entering into several distinct combinations with oxygen. For example, manganese (Mn) forms no less than six such compounds—viz.,  $MnO$ ,  $Mn_2O_3$ ,  $Mn_3O_4$ ,  $MnO_2$ ,  $MnO_3$ ,  $Mn_2O_7$ , which represent different stages of oxidation.

**OXIDES**, Metallic, are the most important of all the compounds of the metals, and in many cases occur naturally as abundant and valuable ores. They are divided by chemists into three classes—viz., (1) basic oxides or bases, (2) saline or indifferent oxides, and (3) acid oxides or metallic acids. The different oxides of the same metal usually afford illustrations of two, and not infrequently of all three of these classes. Thus (to take the case of manganese referred to in the last article) the protoxide ( $MnO$ ) is a powerful base, the red oxide ( $Mn_2O_3$ ) is a saline or indifferent oxide, showing little tendency to combine either with acids or alkalis, while permanganic acid ( $Mn_2O_7$ ) presents all the properties of an acid. "As a general rule, the greater the number of atoms of oxygen which an oxide contains, the less it is disposed to unite with the acids; on the contrary, it frequently possesses acid properties, and then unites with bases to form salts. Protoxides generally are strong salifiable bases; they require one equivalent of a monobasic acid to form neutral salts. Sesquioxides are weaker bases; their salts are usually unstable; they require three atoms or equivalents of a monobasic acid to form a salt which is neutral in composition, though it may not be neutral to test-paper; and in general, all oxides require as many equivalents of acid as they contain atoms of oxygen in their composition. Some of the metallic acids, like the stannic and titan, contain two atoms of oxygen to one atom of metal, but most of them contain three atoms of oxygen—such, for example, as the manganic, ferric, chromic, tungstic, molybdic, and vanadic acids; whilst in a few cases, such as the arsenic, antimon, and permanganic, the pro-

portion of oxygen is still higher."—Miller's "Inorganic Chemistry," 2d edit. p. 314. Of the basic oxides, which form by far the most important class, it may be observed that they are devoid of all metallic appearance, and present the characters of earthy matters, and that six only of them are soluble in water to any considerable extent—viz., the three alkalis, and baryta, strontia, and lime. All the oxides are solid at ordinary temperatures, and as a general rule, the addition of oxygen to a metal renders it much less fusible and soluble; the protoxide of iron, the sesquioxide of chrominum, and molybdic acid being the only oxides that melt more readily than the metal.

**OXLEYA**, a genus of trees of the natural order *Cedrelaceæ*, of which one species, *O. xanthoxyla*, the **YELLOW WOOD** of Eastern Australia, is a very large tree, 100 feet high, valuable for its timber.

**O'XUS**, the ancient name of a great river in Central Asia, which is called by the Turks and Persians **JIHON**, and **AMU** or **AMU-DARIA** by the natives of the country through which it flows. The O. rises in **Lake Sari-kol**, in the elevated plateau which separates Eastern and Western Turkestan. It flows through **Buddakshan**, **Bokhara**, and **Khiva**, and empties itself by several mouths into the **Sea of Aral**. In the first part of its course, its volume is increased by numerous affluents, but it receives no tributaries after entering **Khiva**, from which point its course is wholly through a dry sandy desert. Its total length is about 1150 miles. The value of the Oxus for the purpose of water communication, is said by recent Russian geographers to have been much overrated in Europe; and they add that, in summer, vessels of even slight draught could only be got upon the stream by shutting off the irrigation canals, and risking the desolation of the country dependent on them for its crops. The true value of the Oxus lies in the means it will supply of irrigating the sterile alluvial wastes through which it runs. Before the Christian era, it is believed that the Oxus flowed into the Caspian, and that since 600 A.D. it has twice changed its course (see **ARAL**). A great part of the old bed of the Oxus has recently been explored by M. Stebnutzki ("Bulletin de la Soc. de Geogr. de Paris," April 1871), who has ascertained that it has a fall towards the Caspian, from which he infers that its course was not changed by an upheaval of the Turcoman desert, but by the simple accidents of fluvial action on an alluvial soil. In his address to the London Geographical Society in May 1872, Sir Henry Rawlinson said the restoration of the Oxus to its old bed was then under the serious consideration of the Russian government, that it was a work of no engineering difficulty whatever, and would assuredly be accomplished as soon as the neutrality of Khiva was secured.—See "A Journey to the Source of the Oxus," by John Wood, with *Essay of the Geography of the Oxus Valley* by Colonel Yule, 1873, and paper read by Colonel Gordon before the British Association in 1875.

**OXYACIDS**. When Lavoisier, in 1789, gave the name of oxygen to the *Dephlogisticated Air* discovered, in 1774, by Priestley, he believed that the presence of that body was essential to the existence of an acid, and this view was supported by the composition of the principal acids which were then known, such as sulphuric, nitric, carbonic, and phosphoric acids. But, by degrees, acids were discovered into which no oxygen entered, but which always contained hydrogen, and hence acids were divided into two great classes, the *oxyacids* and the *hydracids*; oxygen being supposed to be the acidifying principle in the former, and hydrogen in the latter. At the present day, scientific chemists usually restrict the term *acid* to compounds into which hydrogen enters, and the acids are regarded as salts of the last-named element; thus, sulphuric acid ( $\text{H}_2\text{SO}_4$ ) and nitric acid ( $\text{HNO}_3$ ) are the sulphate and nitrate of oxide of hydrogen; hydrochloric acid ( $\text{HCl}$ ) is chloride of hydrogen, &c.

**OXYCHLORIDES**, chemical compounds containing both chlorine and oxygen in combination with some other element or radical. Chloride of lime ( $\text{CaOCl}$ ), chloride of potash ( $\text{KOC}$ ), oxychloride of lead or Turner's yellow ( $\text{PbCl}_2\text{PbO}$ ) belong to this class.

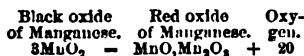
**OXYGEN** (symb. O, equiv. 8; new system, 16—see **CHEMISTRY**—sp. gr. 1.1056) is a colorless, inodorous, tasteless gas, which has never been reduced to a liquid or solid condition. Its chemical affinities for other elementary substances are very powerful; with most of them it is found in combination, or may be made to combine, in more than one proportion; with several in 4, 5, or 6 propor-

tions; and there is only one element (fluorine) with which it does not enter into any combination. Owing to the intensity with which many of these combinations take place, this gas has the power of supporting Combustion (q. v.) in an eminent degree. Of all known substances, it exerts the smallest refracting power on the rays of light. It possesses weak but decided magnetic properties, like those of iron, and like this substance, its susceptibility to magnetisation is diminished or even suspended by a certain elevation of temperature. It is only slightly soluble in water; 100 cubic inches of that liquid dissolving 4.11 cubic inches of gas at 32°, and only 2.99 inches at 50°.

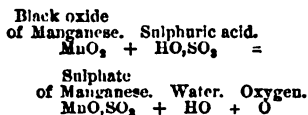
Oxygen gas is not only respirable, but is essential to the support of animal life; and hence it was termed *vital air* by some of the older chemists. A small animal placed in a bell-glass containing pure oxygen will not be suffocated so soon as if it were placed in the same glass filled with atmospheric air. For further details on this property of oxygen, the reader is referred to the article RESPIRATION.

Oxygen is the most abundant and the most widely distributed of all the elements. In its free state (*mixed* but not *combined* with nitrogen), it constitutes about a fifth of the bulk, and considerably more than a fifth of the weight of the atmosphere. In combination with hydrogen, it forms eight-ninths of all the water on the globe; and in combination with silicon, calcium, aluminium, &c., it enters largely into all the solid constituents of the earth's crust; silica in its various forms of sand, common quartz flint, &c.—chalk, limestone, and marble—and all the varieties of clay, containing about half their weight of oxygen. It is, moreover, found in the tissues and fluids of all forms of animal and vegetable life, none of which can support existence independently of this element.

There are various modes of obtaining oxygen, the simplest of which consists in the exposure of certain metallic oxides to a high temperature. It was originally obtained by its discoverer, Dr Priestley, from the red oxide of mercury, which, when heated to about 750°, resolves itself into metallic mercury and oxygen gas. It may be similarly obtained from red oxide and peroxide of lead, the resulting products in these cases being protoxide of lead and oxygen. The following are the chief methods now employed: (1.) The black oxide (or binoxide) of manganese ( $MnO_2$ ) is much employed as a source of this gas. The mineral is reduced to small pieces of about the size of a pea, and introduced into an iron bottle, with a pipe through which the gas may escape. When the bottle is placed in a furnace, and attains a red heat, the mineral parts with one-third of its oxygen, and the red oxide of manganese ( $MnO, Mn_2O_3$ ) remains behind; the reaction being explained by the equation:



(2.) A very pure and abundant supply of oxygen may be obtained by heating chlorate of potash ( $KO, ClO_3$ ), which yields up all its oxygen (amounting to 89.16 per cent.), and leaves a residue of chloride of potassium. One ounce of this salt yields nearly two gallons of oxygen gas. It is found by experiment, that if the chlorate of potash is mixed with about a fourth of its weight of black oxide of copper, or of binoxide of manganese, the evolution of the gas is greatly facilitated, although the oxides do not seem to undergo any change during the process. (3.) Oxygen is readily obtained by heating strong sulphuric acid with about half its weight of powdered black oxide of manganese, or chlorate of potash, in a glass retort; the reaction in the former case being expressed by the equation:



and in the latter case, being of a more complicated character. (4.) Various processes have been proposed for obtaining the gas on a large scale, of which the following,

Oxyhydrogen  
Oyster

948

recommended by St Caire Deville and Debray, is perhaps the best: The vapor of hydrated sulphuric acid is passed over red-hot platinum, by which it is decomposed into oxygen and sulphurous acid, the latter of which may easily be separated (and made available for the formation of sulphites) by its solubility in water or alkaline solutions. It has been calculated that a cubic metre (35·875 cubic feet) of oxygen costs 8s. 4d. when obtained from chlorate of potash; nearly 4s. 1d. when obtained from magnanese; and only 10d. when obtained from sulphuric acid.

Of the compounds of oxygen, it is unnecessary to speak here, as they are described in the articles on the other chemical elements.

Oxygen was discovered almost simultaneously, in the year 1774, by Priestley and by Scheele, the English chemist having the precedence by a few weeks. Priestley gave it the name of *Dephlogisticated Air*; Scheele termed it *Empyreal Air*; Condorcet shortly afterwards, suggested *Vital Air*, as its most appropriate designation; and in 1789, Lavoisier, who, by a series of carefully conducted and very ingenious experiments, proved that the combustion of bodies in the air consisted essentially in their chemical combination with oxygen, and thus overthrew the *Phlogiston* (q. v.) theory, gave it the name which it now retains, in consequence of his (erroneously) believing that it possessed a certain property which is described in the article OXYACIDS.

OXYHY'DROGEN MICROSCOPE. See SOLAR MICROSCOPE.

OXYRHYNCHUS, the name of a celebrated Egyptian fish, said to be revered throughout Egypt, and sacred to the goddess Athor. Its name in Egyptian is *kha*, and the fish in the hieroglyphs was used for this syllable, and particularly expressed the idea of the body. In the ritual, the deceased particularly stated that he had not caught this fish. The name appears to have comprised the genus *Normorus*, distinguished by its pointed nose and long dorsal fin. The fish was worshipped in one of the nomes, which was called after it, and the inhabitants held it in such reverence that they would not touch any fish captured by a hook. When the portions of the body of Osiris were flung into the Nile, this fish alone ate one portion of his body. The O. was not eaten in Egypt, except by the natives of the Cyonopolites Nomos. Its modern name is *Mizeleh*, which seems retained in the Coptic Pemga, the name of the city of Oxyrhynchus. It is represented both in the sculptures and on the coins of the Nome, and was anciently embalmed.—The city of Oxyrhynchus is the modern Behneseh, lying on the west bank of the Nile, in Lower Egypt, near the Bahr-el-Jusuf.

OXYU'RIS VERMICULARIS is the name now assigned by most zoologists to the intestinal worm described as *Ascaris* (q. v.) *vermicularis*, yet it is the original and true *Ascaris*. For the mode of recognising the presence of this worm, and treating patients suffering from its presence, the reader is referred to the articles VERMIFUGES and WORMS.

O'YER AND T'ERMINER (Fr. *ouïr*, to hear; *terminer*, to determine). A commission of oyer and terminer is granted by the crown to all the judges and others to hear and determine all treasons, felonies, and trespasses; and it is by virtue of this commission that the judges on circuit dispose of criminal cases in the various circuits. Sometimes a special commission of the same kind is issued, authorising the judges to go and try prisoners at other than the ordinary times.

O'YSTER (*Ostrea*), a genus of lamellibranchiate molluscs, of the section with a single adductor muscle. See LAMELLIBRANCHIATA. The shell consists of two unequal and somewhat irregularly shaped valves, of laminated and coarsely foliated structure; and the hinge is without tooth or ridge, the valves being held together by a ligament lodged in a little cavity in each. The animal is, in its organisation, among the lowest and simplest of lamellibranchiate molluscs. It has no foot; and, except when very young, no power of locomotion, or organ of any kind adapted to that purpose. Its food consists of animalcules, and also of minute vegetable particles, brought to it by the water, a continual current of which is directed towards the mouth by the action of the gills. The gills are seen in four rows when the valves of the shell are separated, a little within the fringed edge of the mantle. In the most central part is the adductor muscle; towards the hinge is the liver, which is large; and between the adductor muscle and the liver is the heart, which may be

recognised by the brown color of its auricle. The mouth—for, as in the other lamellibranchiata, there is no head—is situated beneath a kind of hood, formed by the union of the two edges of the mantle near the hinge. It is jawless and toothless. The ovaries are very large during the season of reproduction, which extends over certain months in summer, when oysters are out of season for the table. Oysters are hermaphrodite. They produce vast numbers of young. Leenwenhoek calculated that from 8000 to 4000 exist within an O. at once when “sick,” “milky” or full of spawn; and according to Poli, one O. produces about 1,200,000 eggs. The eggs are hatched within the shell and mantle of the parent, and the young are to be seen swimming slowly in a whitish and mucous or creamy fluid surrounding the gills, which becomes darker and of a muddy appearance when they are about to be expelled. Each young O. is then about 1-120th of an inch in length, and about two millions are capable of being closely packed in the space of a cubic inch. When the parent O. expels the young, and this is done simultaneously by multitudes on an oyster-bank, the water becomes filled as with a thick cloud, and the spawn—called *spat* by fishermen—is wafted away by currents; the greater part, of course, to be generally lost, by being driven to unsuitable situations, as exposed rocks, muddy ground, or sand to which it cannot adhere, or to be devoured by fishes and other marine animals, but some do find an object to which it can attach itself for life. The young come forth furnished with a temporary organ for swimming, ciliated, and provided with powerful muscles for extending it beyond the valves and with drawing it at pleasure; and when the O. has become fixed in its permanent place of abode, this organ, being no longer of any use, has been supposed to drop off, or gradually to dwindle away and disappear. But Dr F. Buckland has recently expressed the opinion, that the swimming organ of the young oyster is the “lungs,” and remains as the “lungs” in the mature oyster. In very favorable situations, oysters grow rapidly, so that the Common O. is ready for the table in a year and a half or two years; but in other places, a longer time is required, often about five years.

The species of O. are numerous, and are found in the seas of all warm and temperate climates. None have been found in the coldest parts of the world. The Common O. (*O. edulis*) is the only British species. Like it, the other species are generally found where the water is of no great depth; and some of them, also like it, are very abundant in estuaries, where the water is not very salt. The mangrove swamps of warm climates often abound in oysters of excellent flavor (*O. parantiva*, &c.) adhering to the roots and branches of the trees, within the reach of the tide. Some of the species differ from the common O. not a little in form, as the LONG-NECKED O. (*O. Canadensis*) of North America, which is very elongated; and some of them far exceed it in size. Sir J. E. Tennent states that he measured the shell of an edible O. in Ceylon, and found it a little more than 11 inches in length by half as many in breadth; “thus unexpectedly attesting the correctness of one of the stories related by the historians of Alexander’s expedition, that in India they had found oysters a foot long.” Some species of O. have the valves plaited with strong longitudinal plaits.—For the descriptions here given, we are indebted to the kindness of the editor of the “Field.”

Young oysters readily attach themselves to the shells of old ones, and thus, in favorable circumstances, oyster-banks increase rapidly, so as to fill up shallow parts of the sea, and to form walls which effectually resist the waves and tide. This is very remarkably the case on the alluvial shores of Georgia and some other parts of North America, where these banks are called *Raccoon Banks*, because the racoon, among other animals, visits them to feed upon the oysters. Marshy land extends inwards from 12 to 18 miles from the sea, with tidal rivers meandering through it, and these rivers are kept pretty constant to their channels by the walls of living oysters on both sides. Large bunches of oysters may even be found among the long grass. It is not unusual for the inhabitants of the neighborhood to light a fire, and roast a bunch of oysters on the spot. So abundant are the oysters in many places, that a vessel of 100 tons might be loaded within three times her own length. American oysters, which are of excellent flavor, are an important article of commerce in America, and have begun to be imported (alive) into Britain.

Notwithstanding the prodigious fecundity of the O., however, the beds or banks which yield it for the markets of Britain and other European countries are not sufficiently productive to satisfy the demand, and it is not so much an article of ordinary



ed for all classes, as a luxury of the wealthy. The usual mode of taking oysters dredging is destructive, although, for oyster-beds, which are at all states of the tide covered with a considerable depth of water, nothing better has been devised, and the anxiety of fishermen to make the most of the present opportunity has used many beds to be almost ruined by over-dredging. But the artificial formation of oyster-beds has been resorted to with great promise of success. It is indeed a novelty, having been practised by the Romans. Pliny says that "the first person who formed artificial oyster-beds was Sergius Orata, who established them at Brundisium. . . . This was done by him, not for the gratification of gluttony, but for the sake of gain, as he contrived to make a large income by the exercise of his ingenuity." Sergius Orata lived in the time of Augustus. Among the *ricarii* of the emperors and other wealthy Romans were *ostrearii*, specially devoted to oysters; and oyster-culture has never ceased to be practised in Italy, although to an considerable extent, and particularly in Lake Fusaro, the Acheron of Virgil, a brackish salt-water pond, nowhere more than two yards deep. In Britain, it has also long been practised to some extent, particularly on the coasts of Kent and Essex, for the supply of the London market.

In 1584 an act of parliament was passed, giving exclusive rights to a Company called the "Herne Bay, Hampton, and Reculver Oyster Fishing Company," over a certain portion of the shore at Herne Bay, extending about six miles in length by 1/2 in breadth. The oyster-beds fished by the public had, till then, yielded a very small supply, and it was urged that this supply could be largely increased by a well managed Company. In order that the public should not be injured by this legislation, it was declared by one of the clauses of the Act that "If the Company fail to maintain and cultivate the beds, or to produce well-fed oysters fit for the public market in such quantities as to be of public advantage, all the privileges conferred on the Company would be withdrawn, and the dredging of the beds, as formerly, thrown open to the public to fish."

In 1589, the Board of Trade commissioned Mr Pinwell, Inspector of Oyster Fisheries, to visit the oyster-culture grounds of France, in order to ascertain whether he could gather any useful hints therefrom. In his Report he explained that the English plan, as conducted at Herne Bay, Reculver, Whitstable, Langston Harbor, the Isle of Wight, and other localities, depends on the provision of salt-water tanks or ponds, in which the oysters are kept for a certain time. In France, the system is much more elaborate. He found that the coast is parted off into divisions or districts, each of which is placed under a maritime prefect. Each district is divided and subdivided into smaller portions, managed by commissioners, inspectors, syndics, and watchmen. The determination of "close-time," when oyster-fishing is totally prohibited; the decision how much to fish up, and how much to reserve for re-stocking; the discrimination between public oyster-beds and those which are made over to individuals by "concessions;" the control of the fore-shore; the maintenance of oyster-breeding farms; the prevention of poaching by fishers not belonging to the respective districts—occupy quite an army of officials. Mr Pinwell recommended the adoption of some matters of detail from the French system, but not an imitation of the elaborate official machinery.

In 1872, the enhanced price of oysters in France attracted much public attention. Some observers arrived at an opinion that it was due to three causes—the impoverishment of some of the beds by injudicious dredging; a greatly increased demand for the supply of Germany and Russia; and a private understanding between many of the French Companies, leading to something very like a monopoly. The "Econometrist Français" drew a comparison between various dates, in regard to the number of oysters consumed in Paris, and the price per 100. Considering price alone, we find that it was 1·20 francs per 100 in 1840, 2·63 francs in 1856, 4·58 francs in 1860, 7·20 francs in 1868, and no less than 11·20 francs in 1872. Of course, the price charged to foreign consumers augmented in somewhat the same proportions.

In 1874 the free fishers and the public of Herne Bay complained that the Oyster Company in that locality, above adverted to, had not fulfilled the required conditions. The Company, on the other hand, declared that they had spent £100,000 in 11 years, and were fairly attending to their engagement. The Board of Trade then sent down Mr Spencer Walpole, an Inspector of Fisheries, to hold a Court Enquiry at Herne Bay. He decided on a compromise, by which a certain portion

of the ground was to be re-transferred to the public or free fishers; the remainder being left in the possession of the Company, who would hold the exclusive right of fishing thereon as long as they continued to maintain and foster the beds.—It is gratifying to find that oyster-culture is receiving much attention in Australia. Oyster-farms were established both in New South Wales and in Victoria in 1872.

Oysters live equally well in situations where they are constantly under water, and in those which are left dry by the retiring tide. In the latter kind of situations, they instinctively keep their valves closed when the water deserts them. It is in such situations that oyster-culture can be most easily and profitably carried on. Our space will not admit of details, which we would gladly give. Various methods are adopted of preparing the artificial oyster-bed, by providing suitable solid objects for the oysters to attach themselves to. Stones are piled together, and in such a way that there are many open spaces among them; stakes are driven into the mud or sand; bundles of small sticks are fastened to stones or stakes; floors of planks are formed, at a little height above the bottom, with alleys between them, the under surface of the planks being roughened by the adze; and tiles are arranged in various ways, so as to turn to account the whole space at the disposal of the oyster-cultivator as high as the ordinary tides reach. The method must be varied in accordance with the situation, and the probable violence of winds and waves; but sheltered situations are best in all respects; and experience in France seems to prove that tiles covered with cement are preferable to everything that has yet been tried, as convenient for the cultivator, presenting a surface to which oysters readily attach themselves, and from which they can easily be removed, whilst the larger seaweeds do not grow on it so readily as on stones or wood. By the use of tiles, covered with cement, the cultivator is also able easily to remove young oysters from breeding-grounds to feeding-grounds; the best breeding-grounds being by no means those in which the oyster most rapidly attains its greatest size, and that greenish tinge which Parisian epicures so much desire to see, and which is owing to the abundant confervæ and green mounds of quiet muddy waters.—It has been long known that the oysters of particular localities are finer than those produced elsewhere. Nowhere, perhaps, are finer oysters produced than on some parts of the British coasts. Those of Rutupiceæ, now Richborough, in Kent, were highly esteemed by the Romans, whose epicurism in oysters exceeded that of modern nations.

Of the culinary uses of oysters, it is unnecessary to say anything. Raw oysters, however, are generally believed to be more nutritious and more easily digested, as to many they are more delicious, than oysters cooked in any way; and it does not appear that any such evil consequences ever ensue from eating them, as are known to ensue from eating other kinds of uncooked food. Probably no parasite capable of developing into any form injurious to the human being exists in the oyster.

The genus *Ostrea* gives its name in some zoological systems to a family *Ostreacea*. The fossil species are more numerous than the recent.

The name *O.* is popularly extended to many molluscs not included among the *Ostreacea*, as the Pearl-oyster (q. v.).

Oysters raised in artificial beds are called "natives," and are considered very superior to those which are dredged from the natural beds; although to these last the name of "native" would seem more appropriate than to the other. Some years ago, it was estimated that 500,000,000 oysters were consumed annually in London alone, at a cost of £100,000; but the supply has since lessened, and the price per 100 greatly increased. A large trade in oysters has sprung up in the United States; that of New York alone being estimated at \$25,000,000 annually.

*Fossil Oysters*.—A single species occurs in the Carboniferous Limestone, and as we rise in the crust of the earth, the genus becomes more and more common, no less than 200 species having been recorded, many of them scarcely distinguishable from the living species. The sub-genus *Gryphæa* was a free shell, with a large thick left valve and small concave right valve. Thirty species have been found in beds of the Oolite and Chalk periods. In the same beds there occurs another form of *Ostrea* with subspirally reversed umbones, to which the subgeneric name *Exogyra* has been given. Forty species of this form have been described.

**OYSTERS, Law as to.** The rule is, that he who has the right of property in the soil or sea-shore is entitled to catch or keep and breed oysters there. But the shore below the median line of the tides belongs to the crown, and not to any individual;

and it is only by virtue of some grant from the crown that an individual or a corporation can establish an exclusive title to the sea-shore, and in such a case is exclusively entitled to any oyster-beds there. It is thus always by virtue of a grant from the crown that oyster-fisheries are claimed as the property of an individual or of a corporation. The act 31 and 32 Vict. c. 45, however, now enables the Board of Trade to grant parts of the sea-shore of Great Britain to individuals for breeding oysters and mussels, and has given new remedies for the protection of this property. The general law is as follows: Whoever steals oysters or oyster-brood from an oyster-bed which is private property, is guilty of felony; and whoever unlawfully or wilfully uses any dredge, net or instrument within the limits of a private oyster-bed, for the purpose of taking oysters, though none are actually taken, is guilty of a misdemeanor, and is liable to be imprisoned for three months. But persons are not prevented from fishing for floating fish within the limits of an oyster-fishery, if they use nets adapted for floating fish. Certain statutes as old as the time of Richard II. were passed to protect oyster-brood, but these were recently repealed by the Sea Fisheries Act, 1868 (Paterson's "Fishery Laws of the United Kingdom"). Under the convention between England and France, confirmed by the statute 31 and 32 Vict. c. 45, a close season is prescribed for oyster-fishing in the seas between England and France, from 15th June to 1st September, during which time oyster-fishing boats may be boarded by officers of the coast-guard or navy; and oysters illegally caught may be seized and destroyed, and the master is liable to a penalty. In 1877 an Act was passed appointing 15th June to 4th August as a close time for fishing deep-sea oysters, and from 14th May to 4th August for other kinds, in the British seas; it also grants power to prohibit the fishing in any locality for not more than a year. The law as to oysters in Scotland is substantially the same as in England. As to Ireland, the Irish Fishery Acts give power to the Irish Fishery Inspectors to grant a licence to individuals, as is now done in England, to appropriate a certain tract of the shore for the purpose of forming oyster-beds, and thereupon the beds become private property (Paterson's "Fishery Laws" (p. 257). There is also a close season in Ireland for oysters, like what is established under the convention with France.

OYSTER BAY, a favorite watering-place on the north coast of Long Island, New York, U. S., on a deep sheltered bay, opening into Long Island Sound, 25 miles north-east of New York city. It abounds in handsome residences and fine scenery, and offers facilities for fishing, bathing, &c. Pop. in 1870, 10,595; in 1880, 11,922.

OYSTER-CATCHER (*Hematopus*), a genus of birds of the family *Charadriadae* (q. v.), chiefly inhabiting sea-coasts where they feed on molluscs, crustaceans, annelids, and other marine animals—sometimes even on small fishes. Their legs are of moderate length, like those of the plovers, and, like them, they have no hind-toe. The most remarkable generic distinction is found in the bill, which is long, strong, straight, much compressed and wedge-like toward the point. They are generally said to make use of the bill for opening the shells of oysters and other molluscs; but the late Mr James Wilson expresses a very reasonable doubt on this point. The habits of the British species (*H. ostralegus*), so far as they have been accurately observed, agree with those of the American. It is the only European species, and is common on all parts of the British coasts, on those of continental Europe, the north of Africa, and of the north of Asia. Its whole length is about 16 inches. Its finely-contrasted black and white colors have gained it the name of SEA PIE. It is most abundant on the sea-coast, but often visits inland regions, and sometimes breeds in them. It does not make a nest, but lays its eggs—usually four—on the shingle beach or bare ground. On some of the sandy flat coast of Lincolnshire, the O. is so abundant, that a bushel of the eggs have been collected in a morning by a single fisherman. The American O. is a bird of passage, deserting the northern regions in winter. It is rather larger than the European species, and differs from it in color, and in greater length and slenderness of bill.

OZE'NA (from the Gr. *ozein*, I smell) signifies a discharge of foetid, purulent, or sanious matter from the nostrils. It is a symptom rather than a disease, and may arise from ulceration of the membrane lining the nostrils, or from caries of the adjacent bones, and may accompany syphilitic, scorbutic, scrofulous, or cancerous affections of those or adjacent parts. A slighter form of ozena sometimes follows chronic coryza (or cold in the head), malignant scarlatina, and erysipelas of the face.

The discharge is seldom accompanied by acute pain, unless when caused by cancer, sometimes, however, an aching is complained of. The prognosis must depend upon the nature of the disease, of which the discharge is a symptom. The treatment may be divided into the general or constitutional, and the local. The *general treatment* should consist of tonics combined with alteratives, as the preparations of bark with the alkalies, or with the mineral acids; a dry, bracing air, or a temporary removal to the seaside, is also usually of service. If the discharge arises from syphilis or scurvy, the treatment suitable to those diseases should be prescribed. The *local treatment* consists in the inhalation, once or twice a day, of the steam of boiling water, to which a little creosote or carbolic acid has been added; and in more severe cases, in the thorough syringing of the nostrils, so as to wash away all collections of matter with a copious stream of warm water, to which a little chloride of zinc has been added (about 30 minims of Burnett's solution to half a pint of water).

**OZIERI**, a town of the island of Sardinia, in the province of Sassari, 26 miles east-south-east from Sassari, amongst the mountains which occupy the centre of the island. It stands in a deep valley, open only to the north, and is therefore peculiarly exposed to cold winds. Pop. (1871) 1965.

**O'ZONE** (Gr. *ozo*, I smell). It was remarked long ago that a peculiar odor was produced by the working of an electrical machine. Van-Marum found that, when electric sparks were passed through a tube containing oxygen, the gas became powerfully impregnated with this odor—which he therefore called the “smell of electricity.” Subsequent writers attributed the phenomenon to the formation of nitric acid, due to a trace of nitrogen mixed with the oxygen; especially as the gas was found to act energetically upon mercury. This supposed to be explained, these curious results were soon forgotten. But in 1840, Schönbein (q. v.) with remarkable acuteness, made a closer investigation of the question, and arrived at many most curious results, all of which have not even yet been satisfactorily accounted for. The problem remains, in fact, one of the most perplexing, as well as interesting, questions imperfectly resolved in chemistry.

The earlier results of Schönbein were as follow: (1.) When water is decomposed by the voltaic current, the electrodes being of gold or platinum, the oxygen (which appears at the positive pole) possesses in a high degree the smell and the oxidising power developed by Van-Marum by means of friction-electricity. (2.) When the positive electrode is formed of an oxidisable metal, these results are not observed, but the electrode is rapidly oxidised. (3.) The oxygen collected at a platinum electrode retains these properties for an indefinite period, if kept in a closed vessel; but loses them by heating, by the contact of an oxidisable substance, and even by contact with such bodies as charcoal and oxide of manganese. To the substance, whatever it may be, which possesses such powerful chemical affinities, Schönbein gave the name ozone, from its peculiar smell.

In 1845, he shewed that the same substance can be produced by the action of phosphorus on moist air; and suggested that it might be a higher oxide of hydrogen.

De la Rive and Marignac shortly afterwards, repeating the experiments of Van-Marum, shewed that electric sparks produce ozone even in *pure* and *dry* oxygen; and came to the conclusion, that ozone is oxygen in an *allotropic* state, as diamond is a form of coke or charcoal.

Baumert, in 1853, endeavored to shew that there are two kinds of ozone—one formed from pure oxygen by electric sparks, which he allowed to be allotropic oxygen; the other formed in the voltaic decomposition of water, which he endeavored to prove to be a *teroxide* of hydrogen ( $\text{HO}_3$ ). But Andrews, in 1856, completely refuted this view, by shewing that no such oxide of hydrogen (at least in a gaseous form) is produced in the electrolysis of water; and that ozone, from whatever source obtained, is the same body; and is not a compound, but an allotropic form of oxygen.

In 1860, Andrews and Tait published the results of a series of *volumetric* experiments on this subject, which led to some remarkable conclusions—among which are the following: When the electric discharge is passed through pure oxygen, it *contracts*. If ozone be oxygen in an allotropic form, it must therefore be denser than oxygen. It was found also that a much greater amount of contrac-

tion, and a correspondingly greater quantity of ozone, were produced by a silent discharge of electricity between fine points, than by a brilliant series of sparks. The contraction due to the formation of the ozone is entirely removed by the destruction of the ozone by heat; and this process can be repeated indefinitely on the same portion of oxygen.

In attempting to determine the density of ozone, they used various bodies to take up the ozone from the oxygen containing it; and met with many very curious results. Thus, if mercury be introduced, it is immediately attacked and oxidised, and yet the oxygen *increases* in volume. If iodine be employed, it is immediately oxidised, and *no change* of volume was observed, though the apparatus would have at once rendered visible a change to the amount of 1-60000th of the bulk of the oxygen. By measuring the contraction produced by electricity in the oxygen, then the effect of introducing a solution of iodide of potassium, and determining the amount of oxygen taken up from the quantity of iodine set free, Andrews and Tait shewed that the density of ozone, if it be allotropic oxygen, must be practically *infinite*—i. e., that ozone must have the density of a *liquid* or a *solid* at least, although existing in the gaseous form. This conclusion is, they say, inevitable, unless we make the very improbable assumption, that when iodine, &c., are exposed to ozone, one portion of the ozone (of volume, as oxygen, equal to the volume of the whole ozone) combines with the iodine, and the other portion is restored to the form of oxygen. The paper from whose statements we have quoted concludes with the suggestion that it is *possible* that, in the formation of ozone, oxygen may be decomposed. This is, of course, contrary to all the received notions of chemistry—but such a supposition would at once reconcile all the apparently contradictory facts connected with this singular body. Soret and Von Babo have recently repeated and verified a few of these results, and the former, by using turpentine as an absorbing substance, and also by measuring its diffusion rate, has endeavored to shew that the density of ozone is 50 per cent. greater than that of oxygen—a result on the whole consistent with the recent experiments of Brodie. Andrews has lately shewn that ozone is rapidly destroyed when shaken up with dry fragments of glass, &c. He has also proved that the effect which is (almost invariably, and sometimes in fine weather powerfully) produced by the air on what are called ozone-test papers—paper steeped in iodide of potassium (and generally spoiled by the addition of starch) which are rendered brown (or blue) by the liberation of iodine—is really due to ozone. He did so by shewing that it acts upon mercury as ozone does, and that it is destroyed by heat at the same temperature. This action is more strongly manifested in the air of the open country than in that of towns; and its absence would seem to imply vitiation of the atmosphere.

## P

P, the sixteenth letter of the English alphabet, was in Hebrew called *Pe*, i. e., mouth, most probably from its original form. P. is the thin letter of the initial series (*p, b, f, v*), and is interchangeable with the other letters of the series. P, in Sanscrit, Greek, and Latin, is replaced by *f* in the Teutonic tongues. See F. Words beginning with *p* in English, and its kindred Teutonic tongues, are almost all of foreign origin (Slavic, Celtic, Latin), as *pain* (Fr. *peine*, Lat. *pæna*), *plough* (Pol. *plug*), *pit* (Lat. *puteus*, a well). The Greek prep. *apo* (Sans. *apa*) became in Lat. *ab*; Gr. *hupo*, Lat. *sub*; Sans. *upa*, Lat. *ob*; but before sharp letters, as *t* and *s*, the original *p* was retained in pronunciation, as is shewn by inscriptions (*apstulit, optinus*). There are remarkable interchanges of *p* with a sharp guttural *k* or *q*. Thus, for Lat. *quis, quod, quam*, the Oscan dialect had *pie, pod, pam*; Lat. *equus, coquo*, corresponded to Gr. *hippos* (Æol. *hikkos*), *pepo*; similarly, Gaelic *mac* (son), *ceathair* (Lat. *quatuor*, four), *coig* (Lat. *quinque*, five), correspond to Welsh *map, pedwar* (Gr. *petiores*), *pump* (Gr. *pente* or *peinpæ*). In Gr. *p* is sometimes replaced by *t*, as *tis, tesares*, for *pis, petiores*. In such words as *redemption, consumption*, *p* has been introduced as an intermediary between the incompatible sounds *n* and *t*. The initial *p* of Latin words has for the most part passed into French unaltered; in other positions, *p* has become *v*; thus, Fr. *évêque, cheveu, décevoir, pauvre*, from Lat. *episcopus, capillus, decipere, pauper*.

PA'CA (*Coelogenys*), a genus of rodent quadrupeds, allied to the agoutis, caviars, and capybara, and inhabiting Brazil, Guiana, and some of the West India Islands. The dentition very nearly resembles that of the agoutis. The cheek-bones are prodigiously developed, in a way of which no example exists in any other mammalian animal, so that the zygomatic arches enclose a large hollow space, whilst the bone also descends to an unusual depth from the arch, even below the lower jaw-bone. Within this structure, which gives an extraordinary breadth and peculiar aspect to the face, is a sac in each cheek, opening in front, and lined with a fold of the skin of the face. The whole of this seems to be intended to preserve the true cheek-pouches from external shocks. The cheek-pouches open from the mouth in the usual way, and are capable of very great distention. The lip is cloven; the ears are small; the eyes are large and full; the neck is short; the tail is a mere tubercle; the feet have each five toes; the legs are thick; the back is rounded. The form and gait are clumsy, yet the P. (*C. paca*) is very quick and active. It lives in moist grounds, burrowing like the rabbit, but not so deeply; its burrow, however, is always provided with three openings. It feeds on vegetable substances, and often does great damage to plantations of sugar-cane. It is one of the largest rodents, being about two feet long. It is generally of a dark brown color, with four rows of white spots along the sides, the throat and belly white. A lighter-colored species has been described, but is perhaps a mere variety. The flesh of the P. is much esteemed, and is very fat.

PACAY (*Prosoptia dulcis*), a tree of the natural order *Leguminosæ*, sub-order *Mimoseæ*; a native of Peru, of rather large size, with a broad head; producing pods from twenty inches to two feet long, which contain black seeds imbedded in a sweet flaky substance as white as snow. This flaky substance is used as an article of food and much relished by the Peruvians.

PACE (Lat. *passus*), in its modern acceptation, is the distance, when the legs are

extended in walking, between the heel of one foot and that of the other. Among disciplined men the pace becomes of constant length, and as such is of the utmost value in determining military movements, the relative distances of corps and men being fixed by the number of paces marched, and so on. The pace in the British army is 2½ feet for ordinary marching, and 8 feet for "double-quick" or running time.—With the Romans, the pace had a different signification, and it is important to bear the distinction in mind, when reading of distances in Latin works; the single extension of the legs was not with them a pace, (*passus*), but a step (*gradus*); their pace (*passus*) being the interval between the mark of a heel and the next mark of the same heel, or a double step. This pace was equivalent to 4·84 English feet. The pace was the Roman unit in itinerary measure; the mile being 1000 paces, or 5000 Roman feet, equal to 917 of an English mile. See MILE. Whether measurements were effected by actually counting the paces, or by the time occupied, is not clear; but either method would, with disciplined troops, give a safe result.

In the middle ages, writers confuse accounts of distances by allusion to a geometrical pace, a measure which varied with different authors.

PACHOMIUS, an Egyptian monk of the 4th c., is held in high estimation by the Roman Catholic church, as being the first to substitute for the free asceticism of the solitary recluse, a regular cœnobitic system. He was born towards the close of the 3d c., was brought up as a pagan, but converted to Christianity by the kindness of certain Christians whom he encountered at Thebes. About 340 A.D., at Tabenna, an island in the Nile, he founded the first monastic institution. The members agreed to follow certain rules of life and conduct drawn up by P., and to subject themselves to his control and visitation. He also established the first convent for nuns, which was under the presidency of his sister, and labored with so much diligence and zeal, that at his death, according to Palladius, not fewer than 7000 monks and nuns were under his inspection. The various writings extant under the name of P. are—"Regule Monasticæ" (of doubtful genuineness), "Monita, SS. PP. Pachomii et Theodori," "Epistolæ et Verba Mystica" (a farrago of unintelligible allegory), and "Præcepta S. Pachomii." See "Acta Sanctorum," vol. iii.

PACHYDERMATA (Gr. thick-skins), in the system of Cuvier, an order of Mammalia, including part of the *Bruta* (Rhinoceros, Elephant), and all the *Belluæ* (Horse, Hippopotamus, Tapir, Hog, &c.) of Linnæus, besides one genus (*Hyrax* or *Daman*) of the Linnean *Glîres*. It has been often described as less natural than any other of Cuvier's mammalian orders, as it consists of animals among which there are wide diversities, and the associating characters are rather negative than positive; but it is now universally received by naturalists as indicating a real, though not a close affinity; and when we extend our view from existing to fossil species, numerous connecting links present themselves. As defined by Cuvier, the order consists of those hoofed mammalia (*Ungulata*) which are not ruminants; all of which possess, as a more positive character, a remarkable thickness of skin. This order he divides into three sections—(1.) *Proboscidea*, having a prolonged snout or proboscis, through which the nostrils pass as elongated tubes, a powerful organ of prehension, and a delicate organ of touch, and having also five toes on each foot, enclosed in a very firm horny skin; (2.) *Ordinaria*, destitute of proboscis, although in some (Tapirs), there is such an elongation of the upper lip and nostrils as approximates to it; and the nose is employed, by hogs, &c., in seeking their food, not only as an organ of smell, but as an instrument for turning up the ground, and as an organ of touch; the number of toes varies, four, three, or two on each foot; those with an even number of toes, having in the cleft foot a resemblance to the *Ruminantia*; and (3.) *Solidungula*, in which the foot has but one apparent toe, enclosed in a hoof. Some naturalists have thought it better to separate the *Solidungula* or *Equida* (q. v.) from the P. as a distinct order; whilst others have enlarged instead of restricting the limits of the order, by adding, as a fourth section, the *Herbivorous Cetacea*.

Those P. which have a number of toes differ completely from the mammalia having claws (*Unguiculata*) in their inability to bend their toes in order to seize any object. Some of the *Edentata* have very large hoof-like claws, but this difference still subsists. The fore-limbs of the P. are also incapable of any rotatory motion, serving for support and locomotion only, not at all for prehension; the metatar-

sal and metacarpal bones being consolidated as in the *Ruminantia*, and they have no clavicles.

The largest terrestrial mammalia belong to this order. Most of the P. are of large size, although the damans are a remarkable exception, and some of the hog family are also comparatively small. Most of them have a clumsy form, with a slow and awkward gait; but they are capable of activity beyond what might be supposed, and sometimes move at a pretty rapid pace. Gracefulness and fleetness are characteristics of the otherwise exceptional *Solidungula*. The P. *Ordinaria* have generally great strength, and the larger ones push their way through the entangled thickets of tropical forests, bending or breaking the lianas, small trees, and branches which oppose their progress, their thick hides resisting the spines and broken branches by which the skins of other animals would be pierced. The horse and other *Solidungula* are not inhabitants of forests and jungles, but generally of grassy plains, and their hides are much less thick and hard than those of most of the *Pachydermata*.

The physiognomy of the P. in general is rather dull and unexpressive, the eyes being small, and having that character of which a familiar example is found in the common hog. When enraged, however, they manifest their fierceness in their eyes; and although, in general, mild and gentle, they are capable of being aroused to great fury.

The skeleton of the P. *Ordinaria* and *Proboscidea* is strong and massive; the neck short, the processes of its vertebrae strongly developed; the skull affording a large surface for the muscles which support and move it.

The P. generally feed on vegetable substances. Some are omnivorous. The digestive organs are more simple than in the *Ruminantia*, but exhibit considerable diversity. The stomach is simple in some, and in others is more or less completely divided into sacs, approaching to one of the most remarkable characters of the *Ruminantia*. The intestines are generally longer than in the *Ruminantia*. The dentition exhibits considerable diversity; the adaptation to vegetable food being the most prevalent character. The most important peculiarities of the dentition and digestive organs are noticed in the articles on particular families and genera.

PACIFIC OCEAN, the largest of the five great Oceans (see OCEAN), lies between America on the east, and Asia, Malakla, and Australasia on the west. The name "Pacific," given to it by Magellan, the first European navigator who traversed its wide expanse, is doubtless very appropriate to certain portions of this ocean; but, as a whole, its special claims to the epithet are at the least doubtful, though the name has by long usage become too well established to be easily supplanted by any other.

The greatest length of the P. O. from the Arctic (at Behring's Strait) to the Antarctic circles is 9200 miles, and its greatest breadth, along the parallel of latitude 5° n., about 10,300 miles; while its area may be roughly estimated at 80,000,000 English square miles, or about 2-5ths of the whole surface of the earth. Its form is rhomboidal, with one corner incomplete (at the south), and its surface is studded with numberless islands, either scattered or in groups; these, however, are chiefly confined to the western side. Along the whole eastern side, there is a belt of sea of varying width, which, with a very few exceptions, is wholly free from islands. The deepest sounding yet found (in n. lat. 11° 24', e. long. 143° 16') in the P. O. is 26,850 feet, or above 5 miles—nearly equal to the height of the highest mountain on the globe.

The coasts of the P. O. present a general resemblance to those of the Atlantic, and the similarity in the outline of the western coasts of each is even striking, especially north of the equator; but the shores of the former, unlike those of the latter, are sinuous, and, excepting the north-east coast of Asia, little indented with inlets. The shore on the American side is bold and rocky, while that of Asia varies much in character.

Though the P. O. is by far the largest of the five great oceans, being about equal to the other four in extent, the proportion of land drained into it is comparatively insignificant. Its basin includes only the narrow strip of the American continent to the west of the Andes and Rocky Mountains; Melanesia (with the exception of almost the whole of Australia), which contains few rivers, and none of them of large



size; the Indo-Chinese states, China Proper, with the east part of Mongolia, and Manchuria in the Asiatic continent.

**Winds.**—The trade-winds of the Pacific have certain peculiarities, which have only lately been discovered. In general, they are not found to preserve their peculiar characteristics except within certain limits, thus, the south-east trades are found to blow steadily only between  $92^{\circ}$  and  $140^{\circ}$  of west longitude; while the north-east trades are similarly fluctuating, except between long.  $115^{\circ}$  w. and  $214^{\circ}$  w. Beyond these limits, their action is in whole or in part neutralised by the monsoons and other periodical winds peculiar to the tropical regions of the Pacific. In Polynesia, especially near the New Hebrides group, hurricanes are of frequent occurrence from November to April, but they exhibit few of the terrible characteristics which distinguish the hurricanes of the West Indies and Indian Ocean. North and south of the tropical zone, the winds exhibit little periodicity, being found to blow from all parts of the compass at any given season of the year, though a general westerly direction is most frequent among them. On the coast of Patagonia and at Cape Horn, west winds prevail during the greater part of the year, while in the Sea of Okhotsk they are of rare occurrence. The frightful Typhoon (q. v.) is the terror of mariners in the Chinese seas, and may occur at all seasons of the year. There are many other winds and storms, such as white squalls, cyclones, "tempestades," &c., which are confined to particular localities, and will be found noticed under other heads, and also under STORMS.

**Currents.**—The currents of the P. O., though less marked in character and effects than those of the Atlantic, are yet of sufficient importance to require a brief notice. The *Southern Pacific current* takes its rise south of Van Diemen's Land, and flows eastward at the rate of half a mile per hour, dividing into two branches about long.  $93^{\circ}$  w., the northern branch or *Current of Mentor* turning northward, and gradually losing itself in the counter equatorial current; the southern branch continuing its eastward course till it is subdivided by the opposition of Cape Horn into two branches, one of which, the *cold Current of Peru* or *Humboldt's current*, advances northward along the west coast of South America, becoming finally absorbed in the equatorial current; the other washing the coast of Brazil, and becoming an Atlantic current. The P. O., like the Atlantic, also possesses its equatorial current, separated into a northern and southern current by the equatorial counter-current. It sweeps across the whole ocean from east to west. Two subdivisions of the southern current, called respectively the "current of Rossel" and the "warm current of Australia," flow, the one through the Polynesian Archipelago to New Guinea, and the other along the east coast of Australia. The northern equatorial current, after reaching the coast of Asia, turns north-east, washing the shores of China and Japan, under the name of the *Black or Japan current*; it then sends off a branch along the coast of Kamtschatka, and advances eastward till it becomes lost on the north-west coast of North America. There are other minor currents, the most remarkable of which is that of Fleurién, which describes a kind of irregular circle with a radius of about 240 miles. It is situated in lat.  $25^{\circ}$ – $40^{\circ}$  n., and long.  $133^{\circ}$ – $155^{\circ}$  w. All these currents have their corresponding counter-currents.

There are two "sargassos" or weedy seas of considerable extent in the P. O., one lying  $15^{\circ}$  east-south-east of New Zealand; the other, and by far the larger, about  $15^{\circ}$  west of San Francisco in California. There is also a large region lying nearly half way between Cape Horn and New Zealand, which seems to correspond to the deserts on land, as mariners report it almost wholly destitute of any signs of life either in sea or air.

**History.**—The existence of this ocean first became known to Europeans through Columbus, who had received accounts of it from some of the natives of America, though it was first seen by Balboa, September 29, 1513, and first traversed by Magellan eight years afterwards; but its size, limits, and the number and position of its islands, &c., were little known till long afterwards. Captain Cook deserves the first place among the investigators of the P. O.; and after him come Anson, the two Bougainvilles, La Perouse, Carteret, Vancouver, Krusenstern, Kotzebue, &c. But the most thoroughly scientific examination of its physical condition is that accomplished by the "Challenger" Expedition of 1873–74.

**PACIFICIAN CORPUSCLES** are very remarkable structures appended to the nerves. In the human subject, they are found in great numbers in connection with

the nerves of the hand and foot, and sparingly on other spinal nerves, and on the plexuses of the sympathetic, but never on nerves of motion. They always present a *proximal end*, attached to the nerves by a stalk of fibrous tissue prolonged from the neurilemma, and occasionally one-tenth of an inch long; and a *distal end*, lying free in the connective or areolar tissue. In the human subject, the corpuscles vary in length from one-twentieth to one-tenth of an inch. They are usually seen very readily in the mesentery of the cat, appearing as pellucid oval grains, rather smaller than hemp-seed. The microscopic examination of these bodies discloses an internal structure of a very remarkable kind. They consist, first, of a series of membranous capsules, from thirty to sixty or more in number, enclosed one within the other; and secondly, of a single nervous fibre, of the tubular kind, enclosed in the stalk, and advancing to the central capsule, which it traverses from beginning to end, and where it finally terminates in a fixed swollen extremity. The ten or fifteen innermost capsules are in contact with one another, while the rest are separated by a clear space containing fluid, which is so abundant as to constitute far the largest portion of the bulk of the entire corpuscle. Such are the views of Pacini (as given in his "Nuovi Organi Scoperte nel Corpo Umano," 1840), who is usually regarded as their discoverer, although they had been noticed and roughly described nearly a century before by Vater, of Henle, and of Todd and Bowman; but later observations made by Huxley, Leydig, Kölliker, and others, shew that the question of their true nature is still an open one. Huxley asserts that their central portion is solid, and not hollow; that in birds, and in the human hand there is no fluid between the laminae—and indeed, that the laminae themselves have no real existence—the Pacinian corpuscle being merely a solid mass of connective tissue (a thickened process of the neurilemma of the nerve to which it is attached), whose *apparent lamination* depends on the regular disposition of its elastic elements. If Pacini's view of these structures be correct, there is probably some general analogy between the electric organs of the torpedo and these corpuscles; at present, we know nothing with certainty regarding their office.

**PACKFO'NG**, or Peto'ng, a Chinese alloy or white metal, consisting of arsenic and copper. It is formed by putting two parts of arsenic in a crucible with five parts of copper turnings, or finely divided copper; the arsenic and copper require to be placed in alternate layers, and the whole is covered with a layer of common salt, and pressed down. When melted, the alloy contains nearly the whole of the arsenic, and is yellowish-white in color when in the rough state, but takes a fine white polish resembling silver. It is not very ductile, and cannot be fused without decomposition, as the arsenic is easily dissipated. It was formerly much used in this country, as well as China and India, for making the pans of small scales, dial-plates, and a variety of other articles requiring nicety of make, such as graduated scales for philosophical instruments. It is probably never imported now; the nickel alloys of Europe having quite superseded its use; in China, however, it is still extensively employed.

**PA'CKHORSE**, a horse employed in the carriage of goods, which are either fastened on its back in bundles, or, if weighty, are placed in panniers, slung one on each side across the horse's back. The saddle to which the bundles were fastened consisted of two pieces of wood, curved so as to fit the horse's back, and joined together at the ends by other two straight pieces. This frame was well padded underneath, to prevent injury to the horse's back, and was firmly fastened by a girth. To each side of the saddle, a strong hook was attached, for the purpose of carrying packages, panniers, &c. Panniers were sometimes simply slung across the horse's back with a pad under the band. The panniers were wicker baskets, and of various shapes, according to the nature of their usual contents, being sometimes long and narrow, but most generally having a length of three feet or upwards, a depth of about two-thirds of the length, and a width of from one to two feet. The packhorse with panniers was at one time in general use for carrying merchandise, and for those agricultural operations for which the horse and cart are now employed; and in the mountainous regions of Spain and Austria, and in other parts of the world. It still forms the sole medium for transport; though the mule has, especially in Europe, been substituted for the horse.

An army requires to be accompanied by several thousand pack-animals, some-

times horses, but preferably mules; and in Asia, commonly camels, or even elephants. Pack-saddles are variously fitted, according to the objects to be carried: some for provisions or ammunition; others for carrying wounded men, tents, and in mountain-warfare, even small cannon. In battle, the immediate reserves of small-arm ammunition are borne in the rear of divisions by pack-animals; the heavy reserves being in wagons between the army and its base of operations.

PACOURY-UYA, a sweet and delicious Brazilian fruit, a large berry, produced by the *Platanic insignis*, a tree of the natural order *Chusciaceæ*. The seeds have the taste of almonds.

PACTO'LUS, anciently the name of a small brook of Lydia, in Asia Minor, which rises on the northern slope of Mount Tmolus (modern *Buz Dagh*), flows north past Sardis (*Sart*), and empties itself into the Hermus (*Kodus*). It is never more than ten feet broad, and one foot deep. The sands or mud of P. were long famous in antiquity for the particles of gold dust which they contained, and which are supposed to have been carried down by its waters from the bosom of Tmolus—a hill rich in metals. The collection of these particles, according to legend, was the source of Croesus's vast wealth. But as early even as the time of Strabo, P. had ceased to yield any of the precious dust. The brook is now called *Sarabat*.

PACTUM ILLICITUM is, in the law of Scotland, a contract or agreement for some illegal purpose, i. e., a purpose either expressly prohibited by statute, or by the general policy of the law. Thus, an immoral contract between a man and woman would be held void on the ground that the law discontenances practices *contra bonos mores*. A contract between a client and agent, called a *pactum de quota litis*, whereby a share of the property which is the subject of litigation is given to the agent instead of his usual fees, is void in most cases; though it is often difficult to determine what contracts fall within this rule. The courts, however, have construed very jealously every contract which tends to corrupt the administration of the law, and hence an agreement between a town and country agent to divide the profits has been held a *pactum illicitum*. So agreements by a client to give an excessive sum to his law-agent as a gift have been often set aside.—In England, similar doctrines prevail, though the phrase *pactum illicitum*, which was borrowed from the Roman law, is not used, contracts of this description being technically described as illegal contracts.

PADANG, the capital of the Dutch government of the west coast of Sumatra, is situated in  $0^{\circ} 59' 30''$  s. lat., and  $100^{\circ} 20' 30''$  e. long., and has about 12,000 inhabitants. The Padang flows through the town, but is only navigable for small vessels, the larger requiring to anchor in the roadstead, about three miles distant. On the left bank, stand the houses of the natives, unsightly bamboo erections, elevated about eight feet from the ground by posts of the cocoa-nut tree, and covered with leaves. The government buildings, houses of the Europeans and Chinese, &c., are on the right, and mostly built of wood or stone, and roofed with tile. P. is picturesquely enclosed by a semicircle of mountains, behind which rises a loftier chain, two being volcanoes. There are a Protestant church, a Roman Catholic church, flourishing schools, a fort, military hospital, government workshops, large warehouses, &c. An agent of the Netherlands Trading Company (q. v.) resides at Padang. Being the centre of the exports and imports of Sumatra's west coast, P. has a lively trade, not only with Java, the other islands of the Eastern Archipelago, and Europe, but also with the interior of the island.

The climate is considered healthy, although the heat is great. Colonel Nahys found the thermometer range from  $70^{\circ}$  to  $80^{\circ}$  at 6 A.M., from  $82^{\circ}$  to  $88^{\circ}$  at noon,  $84^{\circ}$  to  $90^{\circ}$  at 2 P.M.,  $78^{\circ}$  to  $84^{\circ}$  at 6 P.M., and from  $72^{\circ}$  to  $80^{\circ}$  at 10 in the evening.

The governor resides at a country-house about two and a half miles above P., and rules over a territory stretching, from the Residency of Bencoolen (which has a population of 112,000 souls, and stands immediately under the government at Batavia), north-west over seven degrees of latitude. It is divided into the residencies of Lower Padang, Upper Padang, and Tapanoei (Tapanuli); the population in 1870 being 1,600,730 natives, 2118 Europeans, and nearly 3000 Chinese.

Lower Padang was the first district of the west coast of Sumatra which submitted to the Dutch, who had formed a settlement at Padang as early as 1600, and by repeated wars, gradually extended their territory.

Upper Padang lies to the north-west of the lower province, from which it is separated by a chain of lofty mountains, some of which, as the Singalang, Merapie, and Sago, attain to nearly 10,000 feet in height; Merapie being an active volcano, the last eruptions of which were in 1845 and 1855, though it sent forth volumes of smoke in 1861. This residency possesses the most lovely districts of the island, or of any tropic land, the mountain slopes being studded with villages, rice-fields, coconut and coffee-trees, of which last, it is calculated that there are 32,000,000 in Upper Padang. In addition to the coffee-culture, gambler, cassia, pepper, ratane, indigo, caoutchouc, &c., are largely produced, and gold, iron, copper, lead, and quicksilver are found. In the district of Tanah Datar is the town of Paggerejong, formerly the capital of the powerful kingdom of Menangkabo, and the residence of the king. Tapanoei, the remaining residency under the government of Sumatra's west coast, lies north-west from Upper Padang. The independent spirit of the inland natives has caused the Netherlands much trouble, but each fresh outbreak only extends their territory and power further into the interior, and towards the north-west of the island.

**PADDLE**, probably the precursor of the OAR (q. v.), and still its substitute among barbarous nations, is a wooden implement, consisting of a wide flat blade with a short handle, by means of which the operator spoons the water towards him. In canoes for only one oar, a double paddle is generally used, which is dipped alternately on either side: the inhabitants of Greenland are especially skilful in this operation. The action of the paddle is the same as that of the oar. The paddle has, however, one advantage—viz., that the rower faces the bow of his boat, and therefore sees what is before him. In threading narrow streams, &c., this is an appreciable gain.

**PADDLE-WHEEL**—one of the appliances in steam-vessels by which the power of the engine is made to act upon the water and produce locomotion—is a skeleton wheel of iron, on the outer portion of whose radii flat boards, called floats or paddles, are fixed, which beat upon the water, and produce, continuously, the same effect as is given, in an intermittent manner, by the blades of oars. The use of paddle-wheels in conjunction with steam as a motive-power dates from about the commencement of the present century, but the employment of the paddle-wheel itself is as ancient as the time of the Egyptians. A specimen is also known to have been tried in Spain in the 16th century.

A certain loss of power is involved, as the full force of the engine on the water is only experienced when the float is vertical, and as on entering and leaving the water the power is mainly employed in depressing or lifting the particles of water. This objection has great force at the moment of starting, or when progress is very slow, as is illustrated by the small power a paddle steamer evinces when trying to tug a stranded vessel off a sandbank; but when in full progress, the action is less impeded by this circumstance, the water in front of the wheel being depressed, and that abast being thrown into the form of a wave. The extent of the immersion much influences the economy of power, as will be readily understood if the consequences of immersion up to the centre of the wheel be imagined. An immersion somewhat over the top of the lowest float is about the most advantageous, and in order that the floats may be as nearly as possible vertical when they strike the water, it is advisable to give the wheel as large a diameter as possible, and to place the axis at the highest available point in the vessel.

To overcome the drawback to the radial wheel, Elijah Galloway patented, in 1829, the *Feathering Paddle-wheel*, in which the floats are mounted on axes, and are connected by rods with a common centre, which revolves upon a pin placed eccentrically to the axis of the paddle-wheel. By this method, the floats are kept, while immersed, at right angles to the surface of the water. So long as the water is smooth the gain is great, consequently feathered floats are much used in river-steamers; but for ocean-steamers the liability to derangement, perhaps at a critical period, is a great objection to their use.

The paddle-wheel, in revolving, imparts both a forward velocity to the vessel and a backward velocity to the water. The latter is called the *slip*, and sometimes bears a very large and wasteful proportion to the former. The absolute velocity of the paddle floats is equal to the sum of the slip and the forward motion of the ship, so that the wheel always revolves faster than the ship makes way.

Paddy  
Padua

962

**PADDY**, or **Paddie**, the name commonly applied in India to rice in the husk. It is the Tamil and the Malay name. See **RICE**.

**PADELLA** (Ital. a frying-pan; plur. *padelle*), a shallow vessel of metal or earthenware used in illuminations. The illumination of St Peter's at Rome, and other large buildings in Italy, is effected by the tasteful arrangement of large numbers of these little pans, which are converted into lamps by partly filling them with tallow or other grease, and placing a wick in the centre. This mode of illumination was first adopted on a large scale in Great Britain on the occasion of the marriage of the Prince of Wales with the Princess Alexandra, when the inhabitants of Edinburgh produced by this means a most magnificent illumination of their city.

**PADERBORN**, the chief town of a district in the Prussian province of Westphalia, situated in 51° 43' n. lat., and 8° 45' e. long., in a pleasant and fruitful district, is built at the source of the Pader, which bursts forth from below the cathedral with sufficient force to drive mills within 93 paces of its point of exit. Pop. (1871) 13,737. P. has narrow, dark, old-fashioned streets, presenting no special attractions, although it has some interesting buildings, as, for instance, the fine old cathedral, completed in 1143, with its two magnificent façades, and containing the silver coffin in which are deposited the remains of St Liborius. It is the seat of a bishop and chapter, and of an administrative court. The manufactures of P., which are not very considerable, include tobacco, starch, hats, and wax-cloths, and there are several breweries, distilleries, and sugar-refineries in the town, which carries on a considerable trade in cattle, corn, and oils. P. is one of the important stations on the Great Westphalia Railway. P., which ranked till 1803 as a free Imperial bishopric, owes its foundation to Charlemagne, who nominated the first bishop in 795. Several diets were held during the middle ages at P., which at that period ranked as one of the most flourishing of the Hanseatic Cities, while it was also numbered among the Free Imperial Cities. In 1604, it was forcibly deprived by the prince-bishop, Theodor of Fürstenburg, of many of the special rights and prerogatives which it had enjoyed since its foundation, and compelled to acknowledge the Roman Catholic as the predominant church, in the place of Protestantism, which had been established during the time of Luther. In 1803, P. was attached as an hereditary principality to Prussia, and after being for a time incorporated in the kingdom of Westphalia, was restored to Prussia in 1813, and incorporated in the Westphalian circle of Minden.

**PA'DIHAM**, a large chapelry and township, in the higher division of the hundred of Blackburn, seated on an eminence springing from the north bank of the Calder, and reached by the Rose Grove station of the Lancashire and Yorkshire Railway, and also by the Leeds and Liverpool Canal. It is about 9 miles north-east of Blackburn. The cotton trade employs a great proportion of the population—(1871) 6675—but coal-mines and extensive quarries also add to industrial activity and the prosperity of P.; which has been greatly improved in appearance recently by several new streets.

**PADILLA**, Juan de, one of the most popular heroes in Spanish history, was a scion of a Toledan family, and was appointed by the Emperor Charles V. military commandant of Saragossa. While he was so employed, a formidable rebellion, caused by the excessive taxes which the emperor imposed on the Spaniards, to defray the cost of his various wars in Italy, Germany, and the Low Countries, broke out among the towns (*comunidades*) of Castile, and the rebels, who were known as *comuneros*, called upon P. to put himself at their head. The introduction of the religious element into the quarrel tended greatly to strengthen the insurgents, and for an instant P. was the ruler of Spain, and formed a new junta to carry on the government. He was successful in a number of enterprises undertaken against the royalist party; but on 23d April 1521, was completely beaten by the royalists at Villaloe. This conflict decided the fate of the rebellion and of P. himself, who was taken prisoner, and next day beheaded.

His wife, Dona Maria de Pacheco, rallied the wrecks of the rebel army, and for a long time held Toledo against the royalist besieging army, and after its fall, retired to Portugal, where she died soon afterwards. With P. and his wife expired the last remnant of the ancient freedom of Spain. Numerous poems and dramas celebrate their deeds.

**PADI'SHAH**, in Turkish *Padishah* (Persian *padî*, protector or throne, *shah*, prince), one of the titles of the Sultan of the Ottoman Empire, and of the Shah of Persia. Formerly, this title was accorded only to the kings of France among European monarchs, the others being called *Kral*, king. It was subsequently allowed to the Emperor of Austria, and still later, by a special article in the treaty of Kutahuk-Kainardji (10th January 1775), to the autocrat of All the Russias. *Padishah* was the title assumed by Baber and his successors on the throne of Delhi.

**PADRO'N**, a very ancient town of Spain, in the province of Coruña, 15 miles south-west of Santiago, on the Sar, a few miles from the coast. *P.* being the place at which the body of Santiago is said to have landed itself, was formerly an important place of pilgrimage. Pop. 6090.

**PA'DUA** (Ital. *Padova*), capital of the province of the same name in Northern Italy, stands on a beautiful plain on the Bacchiglione, 23 miles by railway, west-south-west of Venice. It is surrounded by walls and ditches, and is fortified by bastions. Its houses are lofty, supported for the most part on long rows of arches, generally pointed; and most of its streets, especially in the older quarters, are narrow, dark, dirty, and ill-paved. There are, however, several handsome gates, as those of San Giovanni, Savonarolo, and Falconetto; a number of fine squares, of which the Prato della Valle is the largest and the finest, and is surrounded by a stream, and planted with trees; and several magnificent buildings. Of these, the Café Pedrocchi is esteemed the finest edifice of the kind in Italy. Portions of a Roman edifice were discovered while the foundations of this building were being made, and the marbles found now adorn the pavement, &c., of the *salone*. The Palazzo della Municipalità, built 1172-1219, is the most peculiar and most national in the city. It is an immense building, forming one side of the market-place, rests wholly on arches, and is surrounded by a loggia (q. v.). Its east end is covered with shields and armorial bearings, and its roof is said to be the largest unsupported by pillars in the world. Its hull is 267½ feet long, and 69 feet wide, is covered with mystical and metaphorical paintings, and contains a monument of Livy, the Roman historian, and a bust of Belzoni, the traveller, both natives of this city. The other chief edifices are the cathedral, the church of Sant' Antonio, a beautiful building in the Pointed style, with several Byzantine features, and remarkably rich and splendid in its internal decorations; and the churches of San Giorgio and of Santa Giustina; all of them richly decorated with paintings, sculptures, &c. The university of *P.*, the most famous establishment in the city, was celebrated as early as the year 1221. It embraces 61 professors and other teachers, and is attended by about 1000 students. Connected with the university are an anatomical theatre and a botanical garden, both dating from the 16th c., and each the first of its kind in Europe. There is also a museum of natural history, an observatory, a chemical laboratory, and a library of 120,000 volumes and 1500 manuscripts. There are also numerous palaces, theatres, and hospitals. Pop. (1872) 52,011.

*P.*, the Roman *Patavium*, is one of the most ancient towns of Italy. According to a wide-spread belief of antiquity, alluded to by Virgil, it was founded by the Trojan chief Antenor, but we really know nothing of its history until it became a Roman town. During the first centuries of the empire, it was the most flourishing city in the north of Italy, on account of its great woollen manufactures, and could return to the census more persons wealthy enough to be ranked as *equites* than any other place except Rome. But in 452 Attila utterly razed it to the ground. It was, however, rebuilt by Narses, again destroyed by the Lombards, but once again rose from its ashes, and became a very famous city in the middle ages. It fell into the hands of the Carrara family in 1318, and in 1405 it was conquered by Venice, the fortunes of which it has since shared.

**PADUCAH**, a city of Kentucky, U. S., on the south bank of the Ohio River, just below the mouth of the Tennessee River, 322 miles below Louisville. It is the entrepôt of a fertile country, and has a large trade by the rivers, the Louisville, Paducah, and South-western and the Paducah and Memphis Railways. It contains county buildings, 4 banks, 3 shipyards, steam saw-mills, extensive manufacturing establishments, and 15 churches. Pop. (1870) 6866; (1880) 8036.

**PADU'LA**, a town of South Italy, in the province of Salerno, 52 miles south-east of the town of Salerno, in a mountainous district. Below *P.* are the ruins of

Pean  
Pægon

964

the once famous and magnificent monastery, *La Certosa di S. Lorenzo*, despoiled by the French during their occupation of Calabria. Pop. (1871) 8566.

**PÆ'AN** (of doubtful etymology), the name given by the ancient Greeks to a kind of lyric poetry originally connected with the worship of Apollo. The oldest pæans, as we learn from Homer, appear to have been either hymns, addressed to that deity for the purpose of appeasing his wrath ("Iliad," l. 473), or thanksgiving odes, sung after danger was over and glory won ("Iliad," xxiii. 391). Nevertheless, at a later period, they were addressed to other deities also. Thus, according to Xenophon, the Lacedæmonians sung a pæan to Poseidon after an earthquake, and the Greek army in Asia one to Zeus.

**PÆDO-BAPTISM.** See BAPTISM, INFANT.

**PÆ'ONY** (*Peonia*), a genus of plants of the natural order *Ranunculaceæ*; having large flowers, with five persistent, unequal, leafy, and somewhat leathery sepals, 5-10 petals, many stamens, and 2-5 germens, which are crowned with a fleshy recurved stigma. The leaves are compound, the leaflets often variously and irregularly divided. The fibres of the root are often thickened into tubers. The species are large, herbaceous perennials, or rarely half-shrubby; natives of Europe, Asia, and the north-west of America. None of them are truly indigenous in Britain, although one (*P. corallina*) has found admittance into the English Flora. On account of the beauty of their flowers, some of them are much cultivated in gardens, particularly the COMMON P. (*P. officinalis*) a native of the mountain-woods of the south of Europe, with carmine or blood-red flowers. A variety with double flowers is common.—The WHITE P. (*P. albiflora*), is another favorite species. It is a native of the central parts of Asia. Its flowers are fragrant.—The TREE P., CHINESE P., or MOUTAN (*P. moutan*), is a half-shrubby plant, a native of China and Japan. In favorable circumstances, it attains a very large size, and a height of twelve feet or more. It has been long cultivated in China and Japan; and is now also a favorite ornamental plant in the south of Europe, and in the south of England and Ireland; but the late spring-frosts of most parts of Britain are injurious to it, although it can bear severe frost in winter, when vegetation is at a stand. It flowers in spring. The varieties in cultivation are numerous. It is propagated by cuttings, and also by grafting. Its germens are surrounded by a cup-shaped lacinated membrane.—The roots of most of the peonies have a nauseous smell when fresh, and those of the Common P. were in high repute among the ancients as an antispasmodic—hence the name *Peony*, from *Paion*, a Greek name of Apollo, the god of medicine—but their medicinal properties are now utterly disregarded. The globose, shining black seeds of peonies were formerly, in some countries, strung into necklaces, and hung round the necks of children, as *anodyne necklaces*, to facilitate dentition. The Daurians and Mongolians use the root of *P. albiflora* in their soups, and grind the seeds to mix with their tea.

**PÆ'STUM**, anciently a Greek city of Lucania, in Southern Italy, in the present province of Salerno, on the *Sinus Paestanus*, now the Gulf of Salerno, and not far from Mount Alburnus. It was founded by the Terezenians and the Sybarites, some time between 650 and 610 B.C., and was originally called *Poseidonia* (of which *Paestum* is believed to be a Latin corruption), in honor of Poseidon (Neptune). It was subdued by the Samnites of Lucania, and slowly declined in prosperity after it fell into the hands of the Romans, who established a colony here about 273 B.C. The Latin poets celebrate the beauty and fragrance of its flowers, and particularly of its roses, which bloomed twice a year. Wild roses, it is said, still grow among its ruins, which retain their ancient property, and flower regularly both in May and November. P. was burned by the Saracens in the 10th c., and there is now only a small village called Pesto, in a marshy, unhealthy, and desolate district; but the ancient greatness of the city is indicated by the ruins of temples and other buildings. These appear to have been first noticed in the early part of the 18th c. by a certain Count Gazola, in the service of the king of Naples; they were next described by Antoual, in a work on the topography of Lucania (1745), and have since been visited by travellers from all parts of Europe.

**PAGA'NI**, an uninteresting town of South Italy, province of Salerno. In the church of St Michele is the tomb of Alfouso de' Liguori, founder of the order of

the Redemptionists, who died here, 1787. The body is preserved in a glass case. Pop. about 12,000.

**PAGANINI**, Nicola, a famous violinist, son of a commission-broker at Genoa where he was born in 1784. His musical talent shewed itself in his childhood; in his ninth year, he had instructions from Costa at Genoa, and afterwards from Rolla at Parma, and from Ghirelli. In 1801, he began his professional tours in Italy; in 1828, he created a great sensation on appearing for the first time in the principal towns of Germany; and in 1831, his violin-playing created an equal *furor* in Paris and London. His mastery over the violin has never been equalled, but he was too much addicted to using it in mere feats of musical legerdemain, such as his celebrated performance on a single string. His execution on the guitar was also very remarkable; for four years he made that instrument his constant study. P. died at Nice in 1840, leaving a large fortune.

**PAGANISM**, another name for Heathenism or Polytheism. The word is derived from the Latin *paganus*, a designation of the inhabitants of the country (*pagus*), in contradistinction to the inhabitants of towns, the more educated and civilised inhabitants of towns having been the first generally to embrace Christianity, whilst the old polytheism lingered more in remote rural districts.

**PAGE** (derivation variously assigned to Gr. *pais*, a boy, and Lat. *pagus*, a village), a youth employed in the service of a royal or noble personage. The practice of employing youths of noble birth in personal attendance on the sovereign, existed in early times among the Persians, and was revived in the middle ages under feudal and chivalric usages. The young nobleman passed in courts and castles through the degree of page, preparatory to being admitted to the further degrees of esquire and knight. The practice of educating the higher nobility as pages at court, began to decline after the 16th c., till pages became what they are now, mere relics of feudal usages. Four pages of honor, who are personal attendants of the sovereign, form part of the state of the British court. They receive a salary of £200 a year each, and on attaining a suitable age, receive from her Majesty a commission in the Foot Guards.

**PAGET**, Family of. This noble family, though said to be of Norman extraction, do not trace their descent further back than the reign of Henry VII., in whose time, one William P. held the office of one of the sergeants-at-mace of the city of London. His son William, who was educated at St Paul's School, and at Cambridge, was introduced into public life by Stephen Gardiner, Bishop of Winchester, early in the reign of Henry VIII., who sent him abroad to obtain the opinions of foreign doctors as to his contemplated divorce from Catharine of Aragon. From this time forth his rise was rapid, and he was constantly employed in diplomatic missions until the death of the king, who appointed him one of his executors. He now adhered to the party of the Protector Somerset, and was raised to the peerage in 1552, as Lord Paget of Beaudesert. He shared in the power, and also in the fall, of the Protector, and was heavily fined by the Star Chamber, who also deprived him of the insignia of the Order of the Garter. His disgrace, however, was not of long continuance, and a charge taking place in the councils of his opponents, he soon obtained his pardon. On the accession of Queen Mary, he was sworn a member of the privy council, and obtained several large grants of lands. He retired from public life on the accession of Elizabeth, who regarded him with much favor, though he was a strict Roman Catholic. The representative of the family adhered to the cause of Mary Queen of Scots, and suffered, in consequence, the confiscation of his property. The fifth Lord P. so far departed from the traditional policy of the family as to accept from the parliament the lord-lieutenancy of Buckinghamshire; but he returned to his allegiance shortly afterwards, and held the command of a regiment under the royal standard at the battle of Edgehill. His grandson was advanced to the earldom of Uxbridge, but this title becoming extinct, the representation of the family devolved on a female, who carried the barony of Paget by marriage into the house of Bayly. The son of this marriage, however, having assumed the name of Paget, obtained a renewal of the earldom of Uxbridge, and the second earl, for his gallantry at Waterloo, was advanced to the marquessate of Angle-



sey. Of late years, the P. family have usually held three or four seats in every parliament, and they have constantly supported the liberal party.

**PAGING-MACHINE.** Several machines have been made for paging books and numbering bank-notes, cheques, railway-tickets, and other similar papers. The great object of these machines is to prevent the chance of error or fraud by making it impossible that a page, cheque, &c. can be abstracted or lost without detection. Messrs Waterlow and Sons of London perfected an ingenious machine, by which pages of books, such as ledgers and other commercial books, and bank-notes, &c., are numbered in regular succession. The numbers are engraved on metal rows, usually of steel or brass. A series of these rows are so arranged, that when the machine is worked, the numbers must be impressed on the paper in regular succession from 1 to 99,999; and it is impossible to produce a duplicate number until the whole series has been printed. The instrument is made to supply ink to the types, so that it may be locked in such a manner as to admit of being worked without the chance of its being tampered with.

An extremely ingenious modification of this machine has been perfected by M. Anguste Tronillet of Paris, under the name of "Numérateur Mécanique," which is not only more simple, but admits of wider application; for it not only pages books and numbers notes, tickets, &c., but can also be used for numbering bales and other packages of merchandise. The instrument has six rows, on each of which is a set of engraved numbers, so arranged that their revolutions produce in regular succession the required numbers, by the action of a lever which moves horizontally, and supplies the type with ink as it moves backwards and forwards.

**PAGO,** an island belonging to the Austrian crownland of Dalmatia, separated from Croatia by the Moracca Canal, a channel from two to three miles in width. It is long and narrow, runs parallel to the Croatian coast, and has an area of 108 square miles. Pop. 5150, who are most industrious, and support themselves by vine-culture, the manufacture of salt and fishing.

**PAGO'DA** (according to some a corruption of the Sanscrit word *bhāgavata*, from *bhagavat*, sacred; but according to others, a corruption of *put-gada*, from the Persian *put*, idol, and *gada*, house) is the name of certain Hindu temples, which are amongst the most remarkable monuments of Hindu architecture. Though the word itself designates but the temple where the deity—especially S'iva, and his consort Durgā or Pārvaī—was worshipped, a pagoda is in reality an aggregate of various monuments, which, in their totality, constitute the holy place sacred to the god. Sanctuaries, porches, colonnades, gateways, walls, tanks, &c., are generally combined for this purpose, according to a plan, which is more or less uniform. Several series of walls form an enclosure; between them are alleys, habitations for the priests, &c., and the interior is occupied by the temple itself, with buildings for the pilgrims, tanks, porticos, and open colonnades. The walls have, at their openings, *gopuras*, or large pyramidal gateways, higher than themselves, and so constructed that the *gopura* of the outer wall is always higher than that of the succeeding inner wall, the pagoda itself being smaller than the smallest *gopura*. The extent of the enclosing walls is generally considerable; in most instances, they consist of hewn stones of colossal dimensions, placed upon one another without mortar or cement, but with such admirable accuracy, that their joints are scarcely visible. The gateways are pyramidal buildings of the most elaborate workmanship; they consist of several, sometimes as many as fifteen stories. The pagodas themselves, too, are of a pyramidal shape, various layers of stones having been piled upon one another in successive recesses; in some pagodas, however, the pyramidal form begins only with the higher stories, the broad basis extending to about a third of the height of the whole building. The sides of the different terraces are vertical; but the transition from one to the other is effected by a vault surmounted by a series of small cupolas, which hide the vault itself. A single cupola, hewn out of the stone, and surmounted by a globe, generally crowns the whole structure; but sometimes the latter also ends in fantastical spires of a fanlike shape or concave roofs. The pagodas are covered all over with the richest ornamentation. The pilasters and columns, which take a prominent rank in the ornamental portion of these temples, shew the greatest variety of forms; some pagodas are also overlaid with strips of copper, having the appearance

of gold. The most celebrated pagodas on the mainland of India are those of Mathura, Trichinopol, Chalambrun, Konjeveram, Jaggernaut, and Deogur, near Ellora. —That of Mathura consists of four stories, and is about 68 feet high; its base comprises about 40 square feet. Its first story is made of hewn stones, copper, and covered with gilt; the others of brick. A great number of figures, especially representing deities, tigers, and elephants, cover the building. —The pagoda of Tanjore is the most beautiful monument of this kind in the south of India; its height is 200 feet, and the width of its basis is equal to two-thirds of its height. —The pagoda of Trichinopol is erected on a hill, elevated about 800 feet over the plain; it differs in style from other pagodas dedicated to Brahmical worship, and exhibits great similarity with the Buddhistic monuments of Tibet. —The great pagoda of Chalambrun, in Tanjore, is one of the most celebrated and one of the most sacred of India. It is dedicated to S'iva and Párvati, and filled with representations belonging to the mythical history of these gods. The buildings of which this pagoda is composed cover an oblong square, 360 feet long, and 210 feet wide. —At Konjeveram, there are two pagodas—the one dedicated to S'iva, and the other to Párvati. —The pagodas of Jaggernaut, on the north end of the coast of Coromandel, are three: they are erected likewise in honor of S'iva, and are surrounded by a wall of black stones—whence they are called by Europeans the Black Pagodas—measuring 1123 feet in length, 696 feet in width, and 24 feet in height. The height of the principal of these three pagodas is said to be 344 feet; according to some, however, it does not exceed 120—123 feet. —The pagoda of Deogur, near Ellora, consists also of three pagodas, sacred to S'iva; they have no sculptures, however, except a trident, the weapon of S'iva, which is visible on the top of one of these temples. —The monuments of Mavallpura, on the coast of Coromandel, are generally called the Seven Pagodas; but as these monuments—which are rather a whole city, than merely temples—are buildings cut out of the living rock, they belong more properly to the rock-cut monuments of India, than to the special class of Indian architecture comprised under the term pagoda.

The term pagoda is, in a loose way, also applied to those Chinese buildings of a tower-form, which consists of several stories, each story containing a single room, and being surrounded by a gallery covered with a protruding roof. These buildings, however, differ materially from the Hindu pagodas, not only so far as their style and exterior appearance are concerned, but inasmuch as they are buildings intended for other than religious purposes. The Chinese call them *Ta*, and they are generally erected in commemoration of a celebrated personage, or some remarkable event; and for this reason, too, on some elevated spot, where they may be conspicuous, and add to the charms of the scenery. Some of these buildings have a height of 160 feet; the finest known specimen of them is the famous Porcelain Tower of Nanking (q. v.). The application of the name pagoda to a Chinese temple should be discountenanced, for, as a rule, a Chinese temple is an insignificant building, seldom more than two stories high, and built of wood; the exceptions are rare, and where they occur, as at Peking, such temples, however magnificent, have no architectural affinity with a Hindu pagoda.

PAGU'RUS AND PAGU'RIDÆ. See HERMIT CRAB.

PAHLANPUR, a town of India, capital of the state of the same name, 260 miles east-south-east of Hyderabad. It is a walled town, is the seat of extensive trade and of several manufactures. Pop. estimated at 80,000, many of whom are artificers and shop-keepers. The state of which P. is capital lies between lat. 23° 57'—24° 41' N., and long. 71° 51'—72° 45' E. One-seventh of the population are Moslems, and the remainder Hindus. The state, whose revenue, 1870—1871, was £37,593, pays an annual tribute of £5000 to the Guicowar, and £600 per annum for the maintenance of a British political agent. The exact area of the state is not known; the state, however, contains 300 villages; pop. 216,000. The products are wheat, rice, sugar-cane and cotton. In the north and west, the soil yields only one crop annually; but in the south and east, three crops are obtained in the year.

PAILA is, according to the Purânas (q. v.), one of the disciples of Vyâsa (q. v.), the reputed arranger of the Vedas (q. v.); he was taught by the latter the R'igveda, and, on his part, communicated this knowledge to Bâshkali and Indrapramati. This

Pain  
Painting

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tradition, therefore, implies that P. was one of the earliest compilers of the *Rig-veda*.

**PAIN** is an undefinable sensation, of the nature of which all persons are conscious. It resides exclusively in the nervous system, but may originate from various sources. Irritation, or excessive excitement of the nervous system, may produce it; it frequently precedes and accompanies inflammation; while it sometimes occurs in, and seems to be favored by, a state of positive depression, as is seen in the intense pain which is often experienced in a limb benumbed with cold, in the pain which not unfrequently accompanies palsy, and in the well-known fact, that neuralgia is a common result of general debility. Hence, pain must on no account be regarded as a certain indication of inflammation, although it rarely happens that pain is not felt at some period or other in inflammatory diseases. Moreover, the pain that belongs to inflammation, differs very much, according to the organ or tissue affected; the pain, for example, in inflammation of the lungs, differs altogether in character from that which occurs in inflammation of the bowels, and both these pains from that occurring in inflammation of the kidneys.

Pain differs not only in its character, which may be dull, sharp, aching, tearing, gnawing, stabbing, &c., but in its mode of occurrence; for example, it may be flying or persistent, intermittent, remittent, or continued. It is not always that the pain is felt in the spot where the cause of it exists. Thus, inflammation of the liver or diaphragm may cause pain in the right shoulder, the irritation caused by stone in the bladder produces pain at the outlet of the urinary passage; disease of the hip-joint occasions pain in the knee, disease of the heart is often accompanied with pain in the left arm, and irritation of the stomach often gives rise to headache. Pain is differently felt by persons of different constitutions and temperaments, some persons being little sensitive to painful impressions of any kind, while others suffer greatly from slight causes. There even seem to be national differences in this respect; and before the introduction of chloroform, it was a matter of common observation that Irishmen were always more troublesome subjects for surgical operations than either Englishmen or Scotchmen; and the negro is probably less sensitive to pain than any of the white races.

Although in most cases we are to regard pain merely as a symptom to be removed only by means which remove the lesion which occasions it, there are cases in which, although it is only a symptom, it constitutes a chief element of disease, and one against which remedies must be specially directed. As examples of these cases, may be mentioned neuralgia, gastralgia, colic, dysmenorrhœa, and perforation of the intestines; and in a less degree, the stitch of pleurisy, which, if not relieved, impedes the respiration, and the pain of tenesmus, which often causes such efforts to empty the lower bowel, as seriously to disturb the functions of the intestine, and to exhaust the strength.

For the methods of relieving pain, the reader is referred to the articles on the different diseases in which it specially occurs (as COLIC, NEURALGIA, PLEURISY, &c.), and to those on CHLOROFORM, ETHER, INDIAN HEMP, MORPHIA, NARCOTICS, OPIUM, &c.

**PAINE**, Thomas, an author famous for his connection with the American and French revolutions, and for his advocacy of infidel opinions, was born 29th January 1737, at Thetford, in the county of Norfolk in England. He was trained to the business of his father, who was a staymaker, but afterwards obtained a situation in the Customs, and the management of a tobacco-manufactory. His income, however, was small, and he fell into debt, and was dismissed in 1774, upon which he went to America, was favorably received by a bookseller in Philadelphia, and in 1776 published a pamphlet entitled "Common Sense," written in a popular style, in which he maintained the cause of the colonies against the mother-country. The success and influence of this publication were extraordinary, and it won him the friendship of Washington, Franklin, and other distinguished American leaders. He was rewarded by Congress with the appointment of Secretary to the Committee of Foreign Affairs, visited France in the summer of 1787, where he made the acquaintance of Buffon, Malesherbes, La Rochefoucauld, and other eminent men; and in the autumn following, went to England, where, in 1791, he published "The Rights of Man," the most famous of all the replies to Burke's "Reflections upon the French Revolution." The work has gone

through innumerable editions, and has been translated into almost all the languages of Europe. His defence of the principles of the French Revolution against the magnificent assault of Burke and the outcry of the English aristocracy is vigorous, and by no means unsuccessfui. But the value or at least the popularity of the work has been injured by its advocacy of extreme liberal opinions. His assaults on the British constitution exposed him to a government prosecution, and he fled to France, where he was admitted to citizenship; and in 1792, the department of Pas-de-Calais elected him a deputy to the National Convention, where he voted with the Girondists. At the trial of Louis XVI., says Madame de Staël, "Thomas Paine alone proposed what would have done honor to France if it had been accepted—the offer to the king of an asylum in America;" by which he offended the Mountain party; and in 1793, Robespierre caused him to be ejected from the Convention, on the ground of his being a foreigner, and thrown into prison. During his imprisonment, he wrote "The Age of Reason," against Atheism, and against Christianity, and in favor of Deism. After an imprisonment of fourteen months, he was released, on the intercession of the American government, and restored to his seat in the Convention. He was chosen by Napoleon to introduce a popular form of government into Britain, after he should have invaded and conquered the island. But as Napoleon did not carry out his design, P. was deprived of an opportunity of playing the part of legislator for his conquered countrymen. He then retired into private life, and occupied himself with the study of finance. In 1802, he returned to the United States, and died there 8th June 1809. The most complete edition of his works is that by J. P. Mendum (Bost. 1856); the most noted of his numerous biographers is William Cobbett (1796).

**PAINS AND PENALTIES.** When a person has committed some crime of peculiar enormity, and for which no adequate punishment is provided by the ordinary law, the mode of proceeding is by introducing a bill of pains and penalties, the object of which, therefore, is to inflict a punishment of an extraordinary and anomalous kind. These bills are now seldom resorted to, and the last instance of an attempt to revive such a form of punishment was by the ministers of George IV. against Queen Caroline, an attempt which was signally defeated. When a bill of this kind is resolved upon, it is introduced, and passes through all the stages like any other bill in parliament, except that the party proceeded against is allowed to defend himself or herself by counsel and witnesses. The proceeding is substantially an indictment, though in form a bill.

**PAINTER,** in naval matters, is the rope by which a boat is fastened to a ship or pier.

**PAINTERS' CREAM,** a composition used by artists to cover oil-paintings in progress, when they leave off their work: it prevents drying, and the consequent shewing of lines where new work is begun. It consists of six parts of fine nut oil, and one part of gum-mastic. The mastic is dissolved in the oil, and then is added a quarter part of acetate, or sugar of lead, finely triturated with a few drops of the oil. When well incorporated with the dissolved mastic, water must be added, and thoroughly mixed, until the whole has the consistency of cream. It is applied with a soft brush, and can easily be removed with water and a sponge.

**PAINTING,** the art of representing objects to the eye on a flat surface by means of lines and color, with a view to convey ideas and awaken emotions. See ART. As one of the fine arts, painting occupies a prominent place; some claim for it the first place, as combining the chief elements—namely, form, light and shade, and color. As compared, however, with music and poetry, it lacks the important element of movement, the representation being confined, in a great measure, to one aspect and one instant of time. In its ruder and more elementary forms, in which the primary design was to communicate ideas, painting is perhaps the oldest of the arts, older, at all events, than writing (see ALPHABET, HIEROGLYPHICS); and, as a vehicle of knowledge, it possesses this advantage over writing—that no *description*, however minute, can convey so accurate and distinct an idea of an object as a pictorial representation, much less make so vivid an impression. Besides this, it is not limited, as writing is, by differences of language, but speaks alike to all nations and all ages.

The great antiquity of painting is proved by remains discovered in Egypt, and by reference to it in ancient writings. It has been ascertained that as early as the 19th c.

B.C., the walls and temples of Thebes were decorated by painting and sculpture. Ezekiel, who prophesied about 598 years B.C., refers to paintings in Jerusalem after the manner of the Babylonians and Chaldeans. Though no specimens have come down to us, it is evident that paintings of the highest excellence were executed in Greece. This is proved by what is recorded of them, for the subjects of many of those mentioned required the putting forth in a high degree of all the qualities requisite for the production of the greatest historical works, such as form, grouping, expression, foreshortening. From the immense sums given for paintings, the care with which they were preserved in temples and other public buildings, and from the fact of the high state of sculpture at contemporary periods, as proved by well-known works now extant, it may be deduced that painting, which, like sculpture, is based on design or drawing, must have occupied an equally high position. Even the imperfect specimens of painting discovered in Pompeii, where the style and influence of Greek art may be traced to some extent, lead to conclusions highly favorable to the high position of painting in classic times. The chief schools of painting in Greece were those of Sicily, Corinth, Athens, and Rhodes. The first great artist of whose works there is any authentic description, and from details of which an idea may be formed of his attainments, is Polygnotus of Thasos (flor. 480 B.C.), who painted, among other works, those in the *Pœcile*, a celebrated portico at Athens, and the *Lesche*, or public hall at Delphi.

The works of Apollodorus of Athens (flor. 408 B.C.) are described and highly praised by Pliny. Zeuxis, the pupil of Apollodorus, Eupompus, Androcles, Parrhasius (q. v.), the Ephesian, and Timanthes of Sicily, prosecuted painting with distinguished success, and by them it was carried down to the time of Philip the father of Alexander. Of the same period was Pamphilus, celebrated not only for his works, but as the master of the artist universally acknowledged as the greatest of the ancient painters, Apelles (q. v.), who was born probably at Colophon, and flourished in the latter half of the 4th c. B.C. He was highly esteemed by Alexander the Great, and executed many important works for that monarch. Protogenes of Rhodes was a contemporary, and may be styled the rival of Apelles, who greatly admired his works. His picture of Ialyasus the hunter and the nymph Rhodops was preserved for many years in the Temple of Peace at Rome. Art in Greece had now reached its highest point; its course afterwards was downwards.

In Italy, art was followed at a very early period by the Etruscans, and according to Pliny, painting, as well as sculpture, was successfully practised in Ardea and Lanuvium, cities of Latium, perhaps more ancient than Rome. The finest specimens of Etruscan art, however—as the paintings on tombs, and the remains of armor and attire were ornamented with figures, evince unmistakably the influence of, or rather are identical with Greek art. According to Pliny, it was introduced from Corinth about 650 B.C. No great national school of painting ever flourished in Rome, for though the names of Romans who were painters are cited, the principal works of art that adorned the temples and palaces of Rome were obtained from Greece, and it is probable that many of the paintings executed there were by Greek artists. When the seat of empire was transferred to the East, such art as then remained was carried with it, and in a new phase was afterwards recognised as Byzantine art—a conventional style, in which certain typical forms were adopted and continually repeated. This mode has been preserved, and is practised in church-painting in Russia at this present time.

Much discussion has arisen in modern times as to the supposed technical modes or processes of painting employed by the ancients. It seems established that painting in fresco was much practised; but many of the most valuable pictures we read of were removable, and there are accounts of some carried from Greece to Rome. "The Greeks preferred movable pictures, which could be taken away in case of fire" ("Wilkinson on Egyptian and Greek Paintings"), and Pliny says Apelles never painted on walls; besides fresco paintings on walls, therefore, there can be no doubt that the ancients painted on boards; indeed, the name *Tabula* or *Tabula picta* proves this, and it seems to be now generally acknowledged that these were executed in tempore—that is, with size, and probably fixed or protected by some kind of varnish, in the preparation of which oil was used; or in encaustic, a process in which wax was employed to fix and give brilliancy and depth to the colors, heat being applied in working with it.

Painting was revived in Europe in the 13th c.; previous to that period, Byzantine artists chiefly were employed. On the conquest of Constantinople by the Latins in 1204, the Byzantine school was broken up, and many Greek artists were transplanted to Italy, where art was now destined to flourish, so the works of the Italians who profited by their instructions, were necessarily, at the commencement, composed in the Byzantine style. The first Italian whose name is associated with the revival of Italian art is Giotto di Siena; a work by him, a large Madonna, inscribed with his name and the date 1231, is still preserved in that city. The next is Giotto da Pisa (1236). But Giovanni Cimabue (q. v.), (1240—1300), is commonly styled the founder of the Italian school. Several works of considerable importance are ascribed to him; and though he followed the Byzantine arrangement, he ventured occasionally out of the path, introduced the study of nature in his drawing, and imparted a greater degree of softness to his painting than the Byzantine artists. The influence of Byzantine art was not confined to Italy; it operated in Germany, Bohemia and France; but there also art began to assume a national character early in the 13th c., and paintings are still preserved at Cologne, dated 1224. The Italian school of painting, or that style in which so many of the highest qualities of art have been so successfully carried out, received its chief impetus from Giotto (q. v.), the son of Bordonone, born in 1236 at Vespignano, near Florence, where he died in 1336. It is said that he was originally a shepherd-boy, and being discovered by Cimabue drawing a sheep on a slate, was instructed by him in painting. His style is distinguished from that of earlier painters by the introduction of natural incidents and impressions, by greater richness and variety of composition, by the dramatic interest of his groups, and by total disregard of the typical forms and conventional style of his predecessors. His influence was not confined to Florence, but extended over the whole of Italy; and works by this artist may be traced from Padua to Naples. Giotto followed Pope Clement V. to Avignon, and is said to have executed many important pictures there, and in other cities in France. The most celebrated of his frescoes now extant are those at Assisi; some noted works by him in that class also remain at Padua, Florence, and Naples. Most of the small enamel-pictures ascribed to him are of doubtful authenticity, but some preserved in the gallery at Florence are acknowledged to be genuine. His high powers as a sculptor and architect are also exemplified by works in that city. Giotto had numerous scholars and imitators, and several of these have left works which shew that while they profited by his instruction or example, they were also gifted with original talent. Among these may be noticed Taddeo Gaddi, the favorite pupil of Giotto (born 1300, living in 1352); Simone Memmi (1284—1344); and Andrea Orcagna (1339—1399), one of the artists employed in the decoration of the celebrated Campo Santo at Pisa. Painting in Italy continued to be impressed with the feeling and style of Giotto for upwards of a hundred years; but early in the fifteenth century, the frescoes executed by Masaccio (1401—1443) in the Brancacci Chapel in the Carmelite Church at Florence, clearly prove that it had entered on a new phase, and had come forth strengthened by an important element in which it formerly was deficient, viz., correct delineation of form, guided by the study of nature. These celebrated frescoes, twelve in number, were at one time all ascribed to Masaccio; but it seems now to be acknowledged by judges of art that two of these are by Masolino da Panicale (1378—1415), the master of Masaccio; and three or probably four, and a small portion of one, by Filippo Lippi (1460—1506). The frescoes by Masaccio, however, are superior to those by Masolino and Lippi, and, indeed, for many of the highest qualities in art, have, as compositions, only been surpassed by Raphael in his celebrated cartoons. In about a century from Masaccio's time, painting in Italy attained its highest development; but before referring to those artists who are acknowledged as having carried painting to the highest elevation it has attained since the period of the middle ages, it is right to note the names of some of the painters who aided in raising it to that position. The works of Fra Giovanni da Fiesole (1387—1456) are highly valued and esteemed by many critics as the purest in point of style and feeling, and so the best fitted for devotional purposes. Confining his efforts to simple and graceful action, and sweet and tender expression, he adhered to the traditional types, and ventured on none of the bold innovations which were introduced in his time, and carried so far by Masaccio. His example, as regards feeling and expression, influenced many succeeding artists, particularly Pietro

Perugino, the master of Raphael (1446—1524), and Francesco Francia of Bologna (1430 or 1433—1517), by both of whom these qualities, united to greatly improved technical power, were brought to high excellence. Giovanni Bellini, the founder of the early Venetian school (1422—1512), has left many admirable works; he had numerous scholars, among them Titian and Giorgione. Domenico Corradi or Ghirlandajo, under whom Michael Angelo studied, successfully followed out that direction given to art by Masaccio, which involved individuality of character and expression in the figures. Andrea Mantegna, of the school of Padua (1430—1506), along with strong expression, gave an impetus to form, modelled on Greek or classic art. Luca Signorelli of Cortona (about 1440—1521), successfully exemplified powerful action and bold foreshortening, particularly in his frescoes at Orvieto, which, with his other works, are supposed to have strongly influenced the style of Michael Angelo. Antonello da Messina (1447—1496) is said to have been a pupil of Jan Van Eyck, who imparted to him his secret in the preparation and use of oil-colors, the knowledge of which he spread among the Venetians. The above statement, however, as to the exact period at which oil painting was first introduced, is one attended with much doubt. Painting with colors mixed in oil is mentioned by Italian writers before the period of Van Eyck; painting *in tempore*, or *size*, was continued in Italy, particularly in the Florentine and Roman schools, to the time of Raphael; and the transition from the one method to the other has been so gradual, that many judges of art have expressed inability to determine whether the pictures of Perugino, Francia, and Raphael are in oil or *tempore*, or in both. The practice of painting on canvas, in place of wooden boards or panels, was introduced and carried on for a considerable time in Venice before it was adopted in other parts of Italy, and canvas is the material best suited for pictures in oil-colors when they are not of small dimensions; so, on the whole, the conclusion seems to be, that though oil-painting was not unknown in Florence and the south of Italy, painting *in tempore* was longer practised there than in Venice. At the time when the painters above referred to flourished, there were many able artists in Germany, whose works are deservedly very highly prized. Among these, Jan Van Eyck (q. v.), (about 1390—1441), deserves special notice. To him is generally given the credit of being the first painter who used oil in place of size in his colors. His works are remarkable for brilliant and transparent coloring and high finish. He had numerous scholars; among these, Justus of Ghent (flor. 1451), Hugo Vander Goe (died 1480)—supposed to be the painter of the celebrated wings of an altar-piece, now at Holyrood Palace, containing portraits of James III. and his queen—Roger of Bruges (1365—1418), Hans Hemling or Memling (died 1489), the best scholar of the Van Eyck school; Quintin Metsys (1450—1529), Jan Van Mabuse (1470—1533), Albert Dürer (q. v.), (1471—1528), Lucas Van Leyden (q. v.), (1494—1533). The career of the two last-named extended to the best period of art, and for many high qualities their works strongly compete with those of the ablest of the Italians; while portraits by Hans Holbein (q. v.), (1497—1554), and Antonio More (1512—1538) rank with those of any school or period. The leading qualities in German art are invention, individuality of character, clearness of coloring, and high finish; but they are inferior to the Italians in embodying beauty; their representation of the nude is angular in form and deficient in the elegance and grace attained by the painters of Italy; and in their draperies they do not attain the simplicity and grandeur so remarkable in the works of their southern competitors.

Anything like an account of the artists by whom painting was carried to its highest pitch, of sufficient comprehensiveness to exhibit their peculiar æsthetic qualities, cannot be attempted in so short a notice as this; but that deficiency is in some degree supplied by, and reference is made to, the biographical notices of distinguished painters given in this work under their names. Keeping this reference in view, therefore, the next step is to note the relative positions generally assigned to the most distinguished painters of that period, with reference to the estimation in which their works are now held. Leonardo da Vinci (q. v.), (1452—1519), Michael Angelo Buonarrotti (1474—1563), and Raphael or Raffaello Sanzio of Urbino (1483—1520), are universally acknowledged as the three greatest among the Italian artists; but two other names may be added as worthy to be put in an equally high place—those of Titian (q. v.), (1477—1576), and Antonio Allegri, surnamed Correggio (q. v.),

(1494—1534). These five painters exhibit in their works, some of them the whole, others the greater portion of the various elements—which in the earlier periods of art had existed apart, and composed distinct styles—united, and more highly developed; while each of them has taken up one of these elements, and carried it not only further than his predecessors had done, but further than it was by his contemporaries, or by any subsequent artist. Thus we see in Leonardo's celebrated picture of the "Last Supper," that though he has adopted the traditional style of composition handed down from Giotto's time, and carried out the religious feeling and dignified expression aimed at by the older masters, the whole is deepened and elevated by the manner in which it is worked out—namely, by a mind and hand possessing mastery over all the elements that are combined in the production of the highest works of art. Michael Angelo was a proficient in all the qualities that constitute a painter, but he carried several of them—viz., grandeur of design, anatomical knowledge, and power of drawing—far beyond all other artists of his own or of later times. Titian and Correggio, again, with great power over every art-element, have each carried one quality further than all other artists—the former, color; the latter, light and shade. Raphael is generally allowed the first place among painters, for, though each of the four artists just referred to carried one, or perhaps two, of the qualities of painting further than he did, he excelled them in every other element but the one for which each was particularly distinguished, and in several of the highest qualities of art he attained to greater excellence than any other artist; the expression of dignity of movement by broad masses and grand lines aimed at in the works of Masaccio, is successfully realised in the cartoons at Hampton Court; and the pictures in which Perugino and Francia so earnestly and successfully embodied female beauty, maternal affection, and infantine purity, are as much inferior to pictures of similar subjects by Raphael as they are above those executed during the decadence of Italian art. Besides the five leading masters just referred to, there were many other Italian artists of great talent, who may be ranged in three classes: 1, the contemporaries of those artists; 2, those influenced by their style; 3, their scholars. Among their contemporaries, the works of Fra Bartolommeo (1469—1517) and Andrea Vannucci, called Andrea del Sarto (1488—1530), both Florentines, deservedly rank very high. Giorgio Barbarelli, called Giorgione (1478—1511), was, under Bellini, a fellow-pupil of, and is generally styled the rival of Titian; and his works, which are of great excellence, prove that he was worthy of that name. In class 2, Correggio himself may rank as being influenced by Leonardo's style, but the great prominence of his other qualities makes his style original and independent. On Bernardino Luini (about 1460, living in 1530), Leonardo's influence is direct; and as he was an able painter, his pictures are very valuable for embodying many of those qualities in art which Leonardo had so much improved. Sebastiano del Piombo, a Venetian (1485—1547), studied under Giovanni Bellini and Giorgione; and after settling in Rome, became intimate with Michael Angelo, who employed him to paint some of his designs, with a view of benefiting by his admirable coloring. His pictures are greatly esteemed, as uniting rich color to grandeur of design. Class 3. All the five leading artists above referred to had pupils or scholars, particularly such of them as, like Raphael, were much engaged in extensive works in fresco, in the execution of which assistants are generally employed. A complete list of these, however, would occupy too much space here. Among the scholars of Michael Angelo, Daniele da Volterra (1509—1566) was the best; and among Raphael's scholars, the first place is generally accorded to Giulio Pippi or Romano (q. v.), (1493—1546). After the first quarter of the 16th c., painting in Italy, except in the Venetian school, shewed symptoms of rapid decline; that school, however, continued its vitality longer than any other in Italy, having flourished with all the life of originality during the whole 16th century. This is attested by the productions of many able Venetian painters; but among those, the works of Jacopo Robusti, or Tintoretto (q. v.), (1512—1594), and Paolo Callari, or Veronese (q. v.), (1528—1588), are by far the most important. The pictures of the former exhibit great vigor in composition, and much richness of color—the former quality evincing the influence of Michael Angelo; the latter, that of Titian. Veronese ranks before even Tintoretto; his compositions are animated and full, and as a colorist he is a powerful rival to Titian, not aiming at the rich glow of that master's tints, but excelling every artist in producing the brilliancy and sparkling effect of mid-daylight on figures gorgeously attired, and seen against



backgrounds enriched with landscape and architecture. The other great schools of Italy, however, as already said, had less vitality than the Venetian, and shewed symptoms of decay at the end of the first quarter of the 16th century. Raphael left numerous scholars and assistants; many of these, after his death in 1520, quitted Rome. The pillage of that city by the French under Bourbon in 1527 had also the effect of dispersing them, and this naturally led to the style of Raphael, so far as they could acquire it, being transplanted into other parts of Italy; but Raphael's style was founded on his own peculiar feeling for the beautiful, and on his own peculiar grace; and all that his scholars had acquired or could convey was a mere imitation of his external forms, without the spirit and pure feeling of which these forms are the expression. The imitation of Michael Angelo became the great object with the Florentines; but his scholars and imitators being unable to comprehend his powerful spirit, and not possessing his technical powers and theoretical knowledge, their pictures are merely exaggerated compositions of academic figures. Nor were Correggio's scholars more successful in following his walk, for they exaggerated the peculiarities of his style, which in their hands became affected and insipid. Leonardo's scholars repeated his distinguishing qualities, modified by their own individual peculiarities, and avoided that academic ostentation displayed by the followers of the masters just named. Their reputation therefore stands higher.

The German painters who succeeded Dürer, Van Leyden, and the other celebrated artists of their period, before referred to, endeavored to improve their national style by the study of Italian art, at first attempting to combine the two styles, and afterwards, to the close of the 16th c., devoting themselves exclusively to the study or imitation of the Italian painters. The works of these artists, the worst productions of any school, form a connecting link between those of the famous old German masters and the vigorous, varied, and attractive works of the painters of the Netherlands in the 17th century.

Towards the end of the 16th, and during the first half of the 17th c., a revival of art in Italy was attempted. This was sought for in two ways by two classes of artists; the larger body were known by the name of Eclectics, from their having endeavored to select and unite the best qualities of each of the great masters, combined with the study of nature; the other class were distinguished by the name of Naturalists, and they aimed at forming an independent style, distinct from that of the earlier masters, based on the indiscriminate imitation of common life, treated in a bold and lively manner. In their development, both classes exercised an influence on each other, particularly the Naturalists on the Eclectics. Eclectic schools arose in various parts of Italy, but the most celebrated was that at Bologna, founded by Lodovico Carracci (q. v.), (1555—1619), assisted by his two nephews, Agostino Carracci (1558—1602), and Annibale Carracci (1560—1609), the most eminent of the three. Many painters of mark were reared in this school; among those, Domenico Zampieri, called Domenichino (q. v.), (1581—1641), and Guido Reni (q. v.), (1575—1642), were by far the most eminent. The art of the Eclectics has been greatly overrated. Till recently, the leaders of that school were always placed on an equality with the best masters of the early part of the 16th c., and far above any of the painters of the 15th century. These notions have recently undergone a complete change; it is now acknowledged that the attempt of the Eclectics to combine the excellences of various great masters, involves misapprehension with regard to the conception and practice of art, for the greatness of the earlier masters was brought out in their individual and peculiar qualities, the uniting of which implies a contradiction. Michael Angelo Amerighi da Caravaggio (q. v.), (1569—1609) was the founder of the Naturalist school; he resided principally at Rome, but at a later period went to Naples, Malta, and Sicily. The Naturalists were in their greatest strength at Naples, where they perseveringly opposed the followers of the Carracci, their leader being Giuseppe Ribera (q. v.), a Spaniard, hence called Spagnoletto (1593—1656). With much of the force of Caravaggio, he united more delicacy and greater vivacity of color. The historical or Scriptural subjects of Salvator Rosa (q. v.), (1615—1673) are in the style of the school of the Naturalists; but on account of his *genre* pieces and landscapes, Salvator is entitled to occupy the place of the originator of a style noted for certain qualities of poetic feeling. The influence of the school of the Naturalists had more important results than that of the Eclectics, for it affected to some extent the leading masters of the Spanish school. At Rome, contem-

poraneously with Domenichino, Guido, and other leading masters of the schools of the Eclectics and Naturalists, the three following artists elevated landscape-painting to a high position—Nicholas Poussin (q. v.), a Frenchman (1594—1665); Claude Gellée, also a native of France (1600—1682), called Claude Lorraine (q. v.); and Gaspre Duchet, named Gaspar Poussin (q. v.), born in Rome, but the son of a Frenchman (1618—1675). Among the great masters who occasionally practised landscape-painting as a distinct branch of art, the earliest were Titian and Giorgione; the Carracci (particularly Annibale) carried out their style with considerable success; the landscapes of Domenichino are esteemed, and other scholars of the Carracci turned their attention in that direction. The reputation of N. Poussin is principally based on his figure-pictures, the subjects of which were mythological and Scriptural. Into these pictures, he endeavored, with considerable success, to infuse the classical style; but his compositions were generally arranged with a large space of landscape background, which was in many cases not the least important portion of the picture; and these, and the pictures he painted falling strictly under the class of landscapes, are distinguished for largeness of style and poetic feeling. Claude and Gaspar directed all their efforts to landscape, and attained to high eminence in that department of art.

The earlier specimens of painting in Spain resemble in style the works of the old German painters, who seem to have disposed of many of their pictures in that country, while Spanish art of the 16th c. was modelled on that of Italy. Titian and Raphael being the masters studied; but when works of the Spanish school are spoken of, those executed in the 17th c. are always understood to be referred to, as it was then that Spanish art became entirely national in feeling and style, and that is the period in which the best works of the school were produced. The two most distinguished Spanish painters are Don Diego Velasquez (q. v.), (1599—1660), and Bartholomé Esteban Murillo (q. v.), (1618—1682). The portraits of the former are characterised by truthful and dignified expression, great breadth and vigorous handling, and rank with the best works of that class of any school; while the Scripture subjects of the latter, which are noted for tender expression, rich color, and powerful light and shade, may be classed with similar works by Rubens and Van Dyck. Spagnoletto, a Spanish painter, has already been referred to as a leading artist of the school of the Naturalists at Naples. Alonzo Cano (1601—1667), Francisco Zurbarán (1598—1662), and Claudio Coello (born between 1630 and 1640—1693), have a high reputation. No name of a Spanish painter of eminence occurs after the close of the 17th century.

Very soon after the period when the Eclectic and Naturalistic schools arose in Italy, a revival of art also occurred in the Netherlands. This was very different in its effects from the revival in Italy, the only results from which were academical imitation of the older masters, and coarse naturalism, either separately or combined in varied proportions; while the works of the artists of the Netherlands executed about the same period, though they do not exhibit the high qualities found in the compositions of the Italian masters of the best period, possess many new and attractive features—freedom, originality of treatment, attention to the peculiar character of individual life, and the daily intercourse of men with each other in all its variety, and the study of nature, brought out with truth and delicacy of execution. Two important schools of art were established by this movement—the Flemish and the Dutch. The Flemish school flourished in Brabant, where the Roman Catholic faith—then making strenuous efforts to oppose the Reformed religion—still retained and actively employed art in its service. The Dutch school flourished in Protestant and republican Holland, where the artist, having to trust to private encouragement, painted, for the most part, familiar subjects from everyday life; and in place of altar-pieces for churches, and large historical and allegorical pictures for palaces, produced the subjects then in demand—portraits, genre pictures, or works in which life and manners are depicted in various phases—landscapes with and without figures, sea-pieces, battle-pieces, compositions representing hunting, animals, game, &c. The catalogue of the names of the able artists of these two schools is long; in the Flemish school, those who stand highest are Peter Paul Rubens (q. v.), (1577—1640), Anthony Van Dyck (q. v.), (1599—1641), David Teniers (q. v.) the Younger (1610—1690), F. Snyders (1579—1657). The following are the most eminent in the long list of artists of the

Dutch school: Rembrandt (q. v.), (1606—1669), Vanderhelst (1618—1670), Albert Cuyp (q. v.), (1605—1691), Terburgh (1608—1681), A. V. Ostade (1610—1685), J. Ruysdael (q. v.), (1630 or 1636—1681), Hobbins (1629—1670), P. Potter (1625—1654), K. du Jarden (1635—1678), Jan Steen (q. v.), (1636—1699), G. Metz (1615—1659), F. Mieris (1635—1681), W. Van de Velde (1633—1707), A. Van der Neer (1618—1684), P. Wouvermans (q. v.), (1620—1668).

Painting has been practised for a very long period in France; but there, as in Spain and in Britain, the marked preference shown in early times by the sovereigns of the country for the works of foreign artists, their undervaluing native talent, and their directing it into a channel supplied from a foreign source, had the effect of neutralising it as the exponent of national feeling. Francis I. is acknowledged to have been a patron of art; he had a desire to possess fine works, and he liberally rewarded able artists, but his patronage was almost entirely confined to foreigners. Louis XIV. did what he could to place French art above that of every other nation; but he had no knowledge of it himself; he did not comprehend its nature and true intention, and imagined that pictures if painted by Frenchmen must necessarily be national. Nevertheless, his influence was, on the whole, highly beneficial to French national art. He always shewed himself desirous to employ native rather than foreign talent, and he encouraged and enlarged the Academy of Fine Arts, which had been founded at the commencement of his reign, under the direction of Lebrun. Although in many respects the principles and the regulations of the Academy tended rather to the perpetuation of debased Italian, than to the development of genuine French art; yet the bringing together of a body of influential French artists, was the measure most likely to foster the feeling of nationality and to lead to the foundation of a national school of art. In the 16th c., François Clouet was distinguished as a portrait-painter; and Jean Cousin as a painter, sculptor, and architect. In the 17th c., among many names, those chiefly deserving notice are Simon Vouet, the brothers Le Nain, N. Poussin, Claude Lorrain, Mignard, S. Bourdon, Le Sueur, J. Courtois (called Borgognone), and Coypel. Among these, the works of the brothers Le Nain alone possess national feeling and character, and they are held in very considerable estimation; those of the others were executed under the influence of foreign art; and excepting Claude's splendid landscapes, Poussin's learned compositions, and some of Borgognone's battle-pieces, hold a low position. The works of Anthony Watteau (1684—1721) are truly national, excellent in execution, and very highly valued. This artist may be classed as at the head of the school of the 18th c.—the period in which art in France became really national. Not only did most of the painters of his school—which lasted till the end of the century, when classic art ruled for a time—form their style upon the works of Watteau, but his influence also affected the British school, which arose soon after that of France was developed. Laocret (1690—1742) was the most successful imitator of Watteau; Pater (1686—1736) followed in the same course; Chardin (1699—1779), though influenced by him, had an original style of his own, and his works now stand high. The pictures of Boucher (1704—1770) exhibit the defects of the French school of the 18th c., unredeemed by the delicacy and grace, and high technical execution and truth of Watteau, Chardin, and Greuze (1725—1806), the last of whom sustained the character of French national art, and carried it into the 19th c., when it was re-established, after the classic school of David, founded at the Revolution, and patronised under the empire of the first Napoleon, had in its turn been laid aside. David (q. v.), (1748—1825), the leader of this school, carried his admiration of classic art to the length of substituting the study of statues, the works by which the art of the ancients is chiefly known, for that of nature. He had numerous able pupils, several of whom, tired with this constant repetition of conventional form, recurred to nature, extended their range of subjects, and infused new vigor into the French school. Among many distinguished artists that have maintained the fame of the French School during the present century the following names may be mentioned: Gérardin, Prud'hon, Leopold Robert, Delaroche (q. v.), Horace Vernet (q. v.), Ary Scheffer (q. v.), Eugène Delacroix (q. v.), and Ingres (q. v.). A number of artists, chiefly pupils of the above, now sustain the high position of French art in every department; while in that of landscape illustrative of French scenery, a branch of art never much studied in past times, great progress has been made, and the rise of this flourishing branch of French art is acknow-

ledged by the French themselves to be due to the works of the English painter Constable, exhibited in Paris in 1824.

The English school was the latest national school that arose in Europe, for although the modern schools of Germany and Belgium are of still later date, having arisen in the present century, still they can scarcely be classed as new schools, but rather as revivals of former national schools. In England, as in France, foreign artists chiefly were in early times employed by the court and the nobles. Henry VIII. competed with Francis I. for the services of the greatest of the Italian artists, and permanently secured those of Hans Holbein, one of the most distinguished of those of Germany. Charles I. liberally patronised Rubens and Van Dyck; and if he had reigned longer, would in all probability, like Louis XIV., have founded a national school. But referring to the separate notices in this work of the foreign artists under their names respectively who were employed in this country and to the article *MINIATURE PAINTING* for notice of several eminent native artists in that branch of art, it is only necessary here to touch on the subject of painting in this country from the time it acquired a truly national character. At the beginning of the 18th c., art in Britain was at the lowest ebb; the career of Sir Godfrey Kneller (q. v.), (1648—1725 or 1726), the last of the foreigners, was drawing to a close; Sir James Thornhill (1676—1734), an Englishman, followed out the decorative kind of art on which Verrio, La Guerre, and others were so much employed; but after his death, that debased style finally went down. The time had now arrived for native artists, if there were any entitled to the name, to assert their independence; and accordingly, in 1734—1735, as many as from thirty to forty artists combined together in London, and instituted an academy for studying the human figure. About the same time, a similar movement was going on in Edinburgh; the contract or indenture for establishing a school of art, dated 18th October 1729, and signed by seventeen artists, besides amateurs, is in the possession of the Royal Scottish Academy. The effort above referred to, of artists combining to found a Life Academy, was mainly due to William Hogarth (1697—1764), who, on this account, and from his first having developed, in a very high degree of excellence in his works, the leading characteristics of the English school, is justly entitled to be considered its founder. This combination led to these important results—it shewed the artists their strength, and enabled them, after a probation of thirty-four years, to found the Royal Academy, an institution managed by artists, and intended to support and encourage a national school of art. The means by which the Royal Academy proposed to attain its purpose were the following: 1, by founding a school where artists may learn their profession; and 2, by instituting an exhibition where, independently of private patronage and support, artists may bring their works directly before the public. Hogarth died four years before the Royal Academy was organised; but he powerfully contributed to its establishment by his exertions in bringing the artists together in 1734, by supporting the modern exhibitions at Spring Gardens, and by ridiculing by his pencil and pen the passion of the cognoscenti of the day for crying up as superior to the modern the doubtful specimens of old art which were largely imported and disposed of at great prices in numerous sale-rooms established for the purpose in London. As regards technical execution, and indeed in style generally, the English artists were at first indebted to the French school, which, in the commencement of the 18th c., was in great vigor. Hogarth himself, in these respects, looked closely at the works of Watteau, engravings from which were well known in this country in his time; indeed, Watteau's pictures were so greatly admired here that he came over and spent the year 1720 painting in London. But Hogarth, though alive to the qualities in art produced by others, ranks among painters as one of the most original, for he greatly extended the dramatic element in painting, and imparted an originality and vigor to it never before attained; and his example has led to that element being one of the leading features of the English school, as is exemplified in the works of Wilkie (q. v.), Leslie (q. v.), Stuart Newton, Bonington, and others; and those of many distinguished artists of the present day. In the department of portrait-painting, many of the works of the British school rank with those of Titian, Van Dyck, and Velasquez, such, for instance, as Reynolds's portraits of Nelly O'Brien and Lady Hamilton, Gainsborough's Mrs Graham and Mrs Siddons, and some of Raeburn's heads, &c. While in that of landscape, the position

of the English school is acknowledged to be very high, its influence now strongly affecting the French school—this is proved by the works of R. Wilson, Gainsborough (q. v.), and Turner (q. v.), the last of whom, for wide range of subject, and rendering of atmospheric effect, stands alone; Constable, whose powerful grasp of nature has excited the emulation of the French artists; Calcott (q. v.), Collins (q. v.), Nasmyth, J. Thomson, Muller, and others; and their successors, the artists of the day, who nobly represent the English school. Animal-painting has also been elevated to a high position. And an important department, that of painting in water-colors, originated in England, and has there attained far higher excellence than in any other country.

Painting is cultivated with success and receives much encouragement in America, but there the features that mark a national school have not yet had time for development. From the close connection between Britain and America, the art of the latter country was naturally influenced by and became assimilated to that of the former. America may, however, justly take credit for having contributed in no small degree to strengthen the British school of art, as several very able members of the Royal Academy were Americans. Benjamin West (1738—1830) was one of the original members, and elected President of the Royal Academy in 1806. J. S. Copley (1773—1815), elected R.A. in 1799; his "Death of Chatham," and "Defence of St Heliers, Jersey, against the French, and Death of Major Pierson at the moment of Victory," are excellent works, and as such were conserved in the National Gallery, London. C. R. Leslie (1794—1859) was born in London of American parents; but in 1799, went to Philadelphia, where he was educated. Returning to London in 1811, he entered the schools of the Royal Academy; was elected academical in 1826, and professor of painting in 1848. G. S. Newton (1794—1835)—he was admitted a student of the Royal Academy in 1821, and elected academical in 1832. Washington Allston (1790—1845) was elected an associate in 1818; but afterwards returned to America, where he died. With the exception of the last named, the feeling evinced in the works of all these artists, influenced by study and continued residence, was essentially English; indeed few have equalled Leslie and Newton in their power of embodying the various incidents made national by English poets; and in none of their works can anything be set down as contributing in any degree to the foundation of a national American school. There is every reason to think, however, that such a school is being gradually evolved, and will soon be developed. Already something like originality of a national kind is exhibited in landscape painting, in which some American artists are endeavoring to embody scenes embracing a vast extent of country, or of extraordinary magnitude—such as those met with in the Andes, at Niagara, or exhibited by floating icebergs; and American literature, having now assumed imposing proportions, and great historical events being now in rapid progress, illustrations of American poetry and pictures of stirring national events will be called forth; and able American artists will doubtless be found to embody them and create a school truly national.

A general survey of painting at the present time exhibits the following aspect and arrangement: 1. A school in Germany, which arose during the present century, ostensibly a revival of the old national, but truly modelled on the early Italian school, the religious element being prominent. Its principal works are mural, of large dimensions, and mostly executed in fresco, or on a kind of fresco lately invented, called *silica* or water-glass painting, from a vehicle of that kind being used. Invention, composition, grouping, and powerful and correct drawing, characterise the modern German works; but being of necessity executed from cartoons, they are deficient in that amount of individual expression, and natural color and effect, that can only be attained by a direct and continued reference to the object represented. 2. A Belgian school, which arose in the present century, and is also a revival of the earlier national schools. Some of the Belgian artists lean to the manner of the very early Flemish school, others to that of which Rubens was the head. The greater portion of the Belgian works are easel-pictures, and many of them rank high for individual expression, color, and technical execution. 3. A French school, exhibiting in active operation the various styles that have at different periods prevailed in that country, sometimes modified or adapted to the taste and feeling of the times. The works of the French school of the eighteenth century were utterly condemned by French artists at the close of that and commencement of the present

century. They would tolerate nothing but what they called classic art. *L'Ecole classique*, as it was styled, was in its turn supplanted by *L'Ecole romantique*. Now, however, all styles are tolerated, even those of foreign schools—for instance, the English school of landscape—and there can be no doubt that, by the extensive range of subject, invention, drawing, and other high qualities the French artists display in their works, they have now raised that school to a very high position. 4. A British school, which has been in existence as a national school nearly as long as that of France, undisturbed by the convulsions that affected it. Vitality in art is maintained by close reference to nature, and this has all along been the leading characteristic of the English school; while the tendency of the artists at present is, taking advantage of the aid of science, which has lately discovered photography, to study nature with still greater earnestness and care. The high claims of the British school, long denied abroad, are now fully admitted. Formerly, foreigners never classed a British school among those of Europe, but now this is invariably done. One of the most popular writers on art in France, Théophile Gautier, in his work, "*Les Beaux-Arts en Europe*," divides the art of the world into four strongly defined zones—viz., Great Britain, Belgium, Germany, and France—Britain being distinguished by "individuality," a potent element in art; Belgium, by "skill;" Germany, by "ideality;" and France, by "eclecticism," or a selection and combination of the qualities of all other schools.

Regarding technical modes or processes of painting, reference is made to the separate notices under *Fresco*, *Encaustic*, *Miniature Painting*. The period when the method of mixing up colors with oil was introduced, and the artists to whom the invention is attributed, have been already alluded to. It is necessary, however, to enter on some details touching the mechanical processes in oil-painting, the branch of the art that occupies the most prominent position; and the practice of cleaning and restoring pictures.

The implements used by a painter in oil are charcoal, chalk, or lead pencils, for drawing the outline; hair-pencils or brushes of various sizes, made of hog's bristles or finer hair, such as sable; a knife or spatula to mix the colors, and a palette or small table of thin wood, to be held in the left hand, on which the colors and tints are placed and mixed; an easel or stand for supporting the picture is also required, and a light rod for steadying or resting the hand on. Large pictures are always executed on canvas, stretched tightly on a frame, and primed or coated with paint. Small pictures are often painted on boards or panels, generally of hard wood, such as oak or mahogany, and similarly primed or prepared; but canvas, even for small works, seems at present to be generally preferred. Panels are apt to twist, or warp, or split, and in the event of the surface of a picture chipping or breaking off from the ground, the damage can be more easily remedied, and its progress stopped, when the picture is on canvas, by re-lining. The color of the ground of the canvas or panel has been the subject of much diversity of opinion among artists in different countries and at various periods; and it is certainly a matter of great importance, as it affects the general color of the work, or makes it necessary for the artist to adopt a peculiar style of working. The color of the ground used by the early masters was white, or nearly pure white. This arose from tempora or size being the medium first used in painting, and a pure white ground prepared with size was necessary for that kind of work. This practice, except as regards the Venetian school, continued till the decline of Italian art. Dull red was the universal color adopted in the eclectic, Naturalist, and late Italian schools, and this is one of the causes of the works of these schools being characterised by blackness and heaviness; at the same time, it is certain that red grounds were also used by many of the best Venetian painters, in whose works these defects are never found, probably from having used an *impasto* or body of color sufficiently powerful to bear out on the ground. A dark ground affords a facility for working expeditiously, and that, probably, was the principal cause for its being adopted. The Dutch and Flemish painters generally used light grounds; some of them light-brown, nearly the color of oak. Van Dyck occasionally used gray, and sometimes, when he painted in Italy, dull red grounds. In the British school, light grounds are preferred. Some artists use smooth canvas, others prefer it rough, and avail themselves of the texture to increase the richness of the surface of their work. All these varieties in the materials are called for in consequence of the numerous styles or modes adopted by painters in oil

colors. Every artist has his peculiar way of working, and in bringing out the color or effect, or special quality in his picture, by which the feeling or idea of the subject he conceives is expressed. No two artists—imitators and copiers are not referred to—produce their tints by mixing colors in the same proportions, nor, indeed, by using the same colors; and it is difficult to lay down general rules for the execution of works, seeing that depends very much on individual feeling and appreciation. The design or drawing is first outlined on the canvas, if it is light, with charcoal, or with white chalk when it is dark, and these lines are easily dusted off or rubbed out when corrections are made. It is then put in with black chalk or a lead pencil. Not many years ago it was the practice of painters, particularly landscape-painters—Nasmyth, for instance—to rub in the design with some brown color, such as a tint composed of burned sienna and black; but this practice is not much adopted now. Some artists make but a slight outline, and paint—or, as it is called technically rub—in the subject in a bold, rough manner, afterwards gradually finishing it up; others draw the design very carefully, and work the picture up in portions, finishing or nearly finishing one portion before commencing another. In arranging the colors, or as it is called, setting the palette, many artists use a great variety of colors, others produce rich tones with few colors; some mix up tints in various gradations, others place the colors on the palette, commencing at the outer edge with white, followed by yellows and burned sienna (a reddish brown), then reds, including lakes, such as pink, madder, next blue, and lastly black, and merely mix up the tint on the centre of the palette with their brush, as they proceed. In laying the colors on the canvas, the painter with his brush mixes or dilutes them with what is called a vehicle or medium. Here, again, the practice of artists is very varied; and this is a matter of importance, as the tone and quality of the picture, as regards texture or surface and transparency, is much affected by the medium employed, and the manner of using it. The durability of the work also depends very much on the medium and the artist's management of it. A medium composed of mastic varnish and drying or boiled linseed oil, named magilp, is that most generally used. This mixture coagulates or forms a jelly, and has the advantage, when placed on the palette, of not running off it, or mixing with the colors when the palette is not held level. Some painters prefer using raw linseed oil mixed with a dryer, such as litharge, or drying oil mixed with turpentine, or copal varnish and turpentine, or copal varnish and oil, with mastic varnish added, to make it coagulate. Other ingredients are often mixed with the medium, to give a thick consistency to the paint, such as fat or thickened nut oil, paste, &c.; and various preparations sold by artists' colormen are much used; for instance, Roberson's medium, and Siccatis de Harlem, a preparation imported from Paris. The mode of using the medium is of great consequence; some apply it very sparingly, others, particularly those who prefer magilp, or a medium that coagulates, employ it lavishly. By the first method, firmness and decision of touch may be exhibited, by the latter, richness and brilliancy of tone; the excess tends to produce, in the one case, a hard and dry surface, and the want of the protection that varnish mixed with the color gives against atmospheric action; the other induces a surface having a horny appearance, and a tendency to darken, or crack, or open up.

Arresting the decay of pictures, and repairing, or, as it is styled, restoring them, after they have suffered from age or bad usage are matters which engage much attention. There can be no doubt that many paintings of vast importance have been saved by the care and skill of those who have earnestly devoted themselves to that kind of work; but picture-cleaning is now a trade followed in numerous instances by ignorant pretenders and quacks, who hold out that they possess some means by which they can freshen a picture, and restore it to the state it was in when originally executed. Generally speaking, the great extent to which this business is carried on is owing to the credulity of those who dabble in collecting old pictures, one great incentive to which being the hope of picking up, or discovering, some picture of great value concealed under the dirt and discoloration acquired in a long course of years; but, nevertheless, there can be no doubt that many proprietors of works of art who collect from far higher motives, are remarkably prone to call in the picture-cleaner when his services are anything but necessary or beneficial. The late Sir Edwin Landseer, R.A., when examined by the Select Committee of the House of Commons appointed to inquire into allegations of damage by cleaning, sustained by the pictures

in the National Gallery of London (Report and Evidence ordered to be printed, 1868), stated in the following terms, his idea of this rage for picture-cleaning, or rather picture-destroying: "The first thing, whenever a picture is sold, I think, is, that it goes to a picture-restorer, or a picture-liner, or a picture-cleaner, no matter what its condition is. It is exactly the same thing as when you buy a horse; your groom says he will be all right when he has a dose of physic through him, whether he wants it or not." The mania for picture-cleaning is not confined to this country; it is extensively carried on with even more ruinous consequences abroad, particularly in Italy, where there is a large traffic in old, and few commissions for modern works, and where in many of the public galleries one or more picture-cleaners, for whom work must be found, are attached as permanent officers.

The process of picture-cleaning, or the removal of the old varnishes or other incrustations by which a painting may be obscured, is effected either by mechanical or chemical means. The first method is accomplished when the varnish on the surface is mastic, by rubbing with the fingers the surface of varnish when in a dry state, by which action it is brought off in a fine white powder; or by scraping or erasing the surface with sharp steel instruments when the surface of the picture is tolerably smooth. The first of these processes is the best that can be employed; but when the surface is rough or unequal, the prominent portions are apt to be over-rubbed; erasing or scraping is often practised in Italy, but rarely in this country. The chemical means consist in the application of solvents, chiefly alkali, or alcohol, to dissolve the old varnish. The danger here is, that the action of these solvents is not always stopped with sufficient promptness and dexterity, and part of the surface of the picture is taken off; consequently it is by this latter process that most destruction is caused. For the various methods employed in picture-cleaning, the Report and Minutes of Evidence, already referred to, may be consulted, and the "Guide Théorique et Pratique de l'Amateur de Tableaux, par Théodore Lejeune" (Paris, 1864), in which are stated all the most approved methods of cleaning and restoring pictures.

Works on painting and painters: Vasari (Florence, 1568); Borghini (Florence, 1584); Rodolphi (Venice, 1648); Zanetti (Venice, 1771); Lanzi (1792), Bolin's edition of Roscoe's translation; Von Rumohr (Berlin, 1827); Kugler's "Hand-book of Painting, Italian Schools of Painting," edited by Eastlake (1855); "German, Flemish, and Dutch Schools," by the same, edited by Sir Edmund Head, Bart. (1846); "Hand-book to Spanish Schools and French Schools" (1848); "Hand-book for Young Painters," by C. R. Leslie, R. A. (1855); Ruskin's "Modern Painters" (1843-1860).

PAINTING (House), is one of the useful arts, combining much that is artistic with much that is absolutely necessary. The primary object of painting houses, or parts of them, either internally or externally, is to preserve them from decay—to cover the parts liable to suffer from exposure with a durable composition. That now used is made of ground whitelead mixed with linseed oil. This produces white paint, which forms the basis of all others. The various colors given to it are produced by the grinding of pigments (or *stainers*) along with the white lead. The commonest of these are ochres (yellow and red earths), lampblack, Venetian red, umber, Prussian blue, chrome, vermilion, &c. Substances called driers are also mixed with the paint, such as spirits of turpentine, boiled oil, litharge and sugar of lead ground in oil. Paint may be laid on any material—stone, wood, iron and plaster being the most usual in buildings. It has the effect of preserving these by filling up the pores in them, and forming a coating on which the moisture of the atmosphere does not act. The paint is laid on in several coats or layers, each being allowed to dry before the next is applied. The usual number of coats for new wood or plaster varies from three to six. Five coats form a good and lasting protection from the weather. Plain painting is generally finished with a coat prepared with a mixture of oil of turpentine, which takes off the gloss from the paint, and leaves the surface quite *mat* or dead. This is called *flatting*. A very common form of decoration in all ages has been to imitate the veins or colors of marbles, and the *grains* or marks of growth of various woods. In modern times, these arts form a separate branch of house-painting, some men being *grainers*, others *marblers*, &c. The mode in which these imitations are produced is by forming a *grounding* of several coats of plain paint—usually four—and applying the coloring coat over this. In



marbling, the coloring matter is marked and veined with *feathers* in place of brushes; and in graining, steel combs are used. When the surface is dry, it is protected with one or more coats of copal varnish.

Besides painting, the decorator uses paper-hangings for adorning the walls of houses. These are applied to the walls with paste. Size-coloring is also used; the coloring matter in this case being mixed with strong Size (q. v.) in place of oil; but this has the disadvantage of being easily acted on by moisture. It is often used for the ceilings of common rooms, and for the walls of kitchens and servants' apartments, being much cheaper than oil-paint. In ancient times, in Greece and Rome, wax was used for mixing the colors with; but although there are many very fine specimens of Roman paintings still preserved on the walls of the houses of Pompeii, the mode in which these decorations were applied is not now known.

**PAINTS, Painters' Colors, or Pigments.** These names are applied to the prepared or unprepared compositions by which wood, stone, and other materials are coated with a preservative surface of oil, mixed with an earthy matter, to give it color and consistency; also to the materials used by artists to produce the colored surfaces of their pictures. The art of painting, in its primitive state, consisted merely in applying such natural, mineral, and vegetable colors as were spontaneously yielded, without any vehicle to render them permanent; consequently, they had to be renewed as often as they were rubbed or washed off from the surfaces to which they were applied. The paints now in use are nearly all mixed with a liquid vehicle, and are applied in the liquid state. The mixing materials are varied according to the requirements of the work. Thus, for some kinds of decorative work, and for water-color drawings, gum, glue, size, or other adhesive materials dissolved in water, are employed; whilst for the painting of buildings, &c., and for oil-paintings, oils of various kinds are used for mixing and thinning the colors. Thus, for painted work exposed to the weather, it is found that linseed oil boiled with the sulphates of lead (litharge) or zinc, or with acetate of lead (sugar of lead), is the best. The preparation of boiled oil is one requiring particular care, as it is desirable to have it bright and clear. Hence the proportions of the metallic salts are much varied by different manufacturers, and by some various other ingredients are added. The time of boiling, and the method of filtering, are also much varied. For indoor work, plain linseed oil and oil (spirit) of turpentine are used; if a *glossy surface* is wished, the linseed oil must be in excess; if a *dull or flattened surface*, then the quantity of turpentine, or turps, as it is often technically called, must be increased; and it is usual to add a small quantity of ground litharge and sugar of lead, which are prepared for this purpose, and sold under the name of *Driers*. For artists' colors, very fine linseed or nut oil is used, unboiled, and in small quantity, and turpentine is employed to dilute them. Paints for very rough purposes, such as ship-work, stone walls, &c., are often mixed with whale oil boiled with white vitriol (acetate of zinc), litharge, and vinegar, and they are diluted with common linseed oil and turpentine.

Most of the paints used for ordinary purposes are composed first of the coloring matter, then of a quantity of white-lead, with which and the oil they are worked into a paste of the shade required, and afterwards thinned down with oil and turpentine when used. The white-lead which thus forms the basis of most paints, and by itself a color, is a carbonate and oxide of the metal, produced by exposing pieces of lead to the action of the steam of acetic acid in beds of fermenting tan. It is the principal white paint used, but is liable to discolouration from the gases contained in impure atmospheres. Other white pigments are prepared from the oxide of zinc, and the carbonate and sulphate of barytes. Pale yellow is made with chromate of strontian, orange-yellow with sulphuret of cadmium, whilst several varieties of this color are produced by chromate of lead, sulphuret of arsenic, or king's yellow, and various native earths in which silica and alumina are combined with oxide of iron. Amongst these are Yellow Ochre, Oxford, Roman, Stone, Orange, Indian, and American Ochres. Reds are either purely mineral, or they are *lakes*, i. e., organic colors precipitated on alumina bases. Of the latter, there are madder-lakes, prepared from madder-roots, and carmine-lakes, prepared from cochineal; of the former, vermillion (bisulphuret of mercury), Indian red (a native oxide of iron), Venetian red (also an oxide of iron), red lead (red oxide of lead or *minium*). A very beautiful red is used by artists called *palladium red*; it is formed of ammonio-per-

chloride of palladium. *Blues* consist of the artificial ultramarine; and for artists' purposes, of the real ultramarine, also the silicate of cobalt, and for water-colors, indigo and Prussian blue. *Greens* are either produced by mixtures of *yellows* and *blues*, or they are made directly from the phosphates, carbonates, acetates, and arsenites of copper, also from the sesquioxide of chromium and from *terre verte*, a native mineral, consisting of iron, silica, potassa, and magnesia. The last two are the best for artists. *Browns* are numerous, and various in their composition. Decomposed peat, burned madder, burned Prussian blue, burned terre verte, asphalt, manganese brown, catechu, umber (which is an oxide of iron with manganese), and mummy, or the asphalt mixed with other matters taken from Egyptian mummies, and amongst the best known and most used. *Blacks* are made of Lamp-black and Bone-black (q. v.), peroxide of manganese, and blue-black, which is made of the charcoal of burned vine twigs.

In all cases, the coloring materials of paints require to be very finely ground, and as many are very poisonous, great care is required in their preparation, and several forms of mill have been invented for the purpose. The principle upon which all are made is to secure the operator from the poisonous dust and exhalations, and to reduce the coloring material, if ground dry, to an impalpable powder, or if mixed with the oil, to a perfectly smooth paste.

PAISIELLO, Giovanni, an eminent musician, son of a veterinary surgeon at Tarnuto, was born in 1741, and received his musical education in the Conservatorio St Onofrio at Naples. Of his earlier operas produced at Naples, the most celebrated was "*Dal Finto al Vero*," composed in 1777. Some of his best works, particularly "*Il Barbiere de Seviglia*," were written during an eight years' residence at St Petersburg. At Vienna, he composed twelve symphonies for a large orchestra, and the opera buffa, "*Il re Teodoro*." Between 1786 and 1799, he produced a number of operas for the Neapolitan theatre, and was appointed by Ferdinand IV. his *maestro di capella*. In consequence of having accepted under the revolutionary government the office of national director of music, he was suspended from his functions for two years after the restoration of royalty, but eventually restored to them. In 1802, he went to Paris to direct the music of the consular chapel; but the indifferent reception, shortly after given to his opera of "*Proserpine*," led him to return to Naples, where he died in 1816. His compositions are characterised by sweetness and gracefulness of melody, and simplicity of structure. Besides no fewer than ninety operas, P. composed masses, requiems, cantatas, an oratorio, instrumental quartets, harpsichord sonatas, concertos, and a highly-praised funeral march in honor of General Hoche.

PAISLEY, a municipal and parliamentary burgh, and an important manufacturing town of Scotland, in the county of Renfrew, on both banks of the White Cart, three miles above its junction with the Clyde, and seven miles west-south-west of Glasgow by railway. The progress of the town has been much hindered by the fact that it was bankrupt for nearly thirty years. A bill was passed in 1872, by which a settlement was effected, and the town properly restored to the corporation. Since then, extensive improvements have been made. An abundant supply of water is brought from the Gleniffer Hills, and more recently from Rowbank.

By far the most interesting edifice is the abbey. It was founded by Walter, the High Steward of Scotland, about 1163, for a prior and 13 monks of the Cluniac order of reformed Benedictines, and was dedicated to St James, St Mirren, and St Milburga. It was the burying-place of the Stewarts before the accession of that family to the throne, and was occasionally used by them afterwards as a place of sepulture. It was raised to the rank of an abbey in 1445. What remains of the building is the nave, of six bays, chiefly in the First Pointed style. In 1862 a thorough restoration of the Abbey (at a cost of £4000) was made, the happiest feature of which was the removal of the unsightly galleries. The eastern gable window represents the Ascension. It is of Munich Manufacture. Another window has been inserted by the St Andrew's Society of Glasgow, in memory of Sir William Wallace, who, if he was born at Ellerslie, was a native of the Abbey parish. Extensive improvements in the surroundings of the abbey are in progress.

Among the other edifices, the principal are the County Buildings, a quadrangular pile in the castellated style; the Neilson Educational Institution, a noble bequest, built in the form of a Greek cross, and surmounted by a fine dome; the Infirmary;

the School of Design; and the Grammar School. This last institution was founded by King James VI., and the present building was completed in June 1864. In 1870 a Free Public Library and Museum was presented to the town, and is maintained by the community under the Free Libraries Act; and by a similar act of liberality, its amenity was increased by a pleasure-ground named the Fountain Gardens. In 1873 a native of Paisley bequeathed £20,000 for the erection of a town hall. P. possesses a trust for the education of boys born in the burgh and Abbey parish, the revenue of which amounts to £500, and is spent on educational bursaries.

In the beginning of the last century, the principal manufactures were coarse linens and checkered cloths. About the middle of that century, the weaving of linen and of silk gauze became the staple manufactures. In 1784 silk gauze was manufactured to the value of £350,000, and employed 5000 looms. Shawls, which used to be a principal article are still an important article of manufacture, began to be made here in the beginning of the present century. Within recent years the annual value of the shawl trade of P. was estimated at about £1,000,000 sterling, but it has now greatly declined. Cotton thread is manufactured on a most extensive scale; indeed P. may be considered the seat of the thread manufacture for the home and American markets. Different varieties of tartan cloths, handkerchiefs, carpets, &c., are made; soap, starch, and corn flour are largely manufactured; dyeing is carried on by several firms on an extensive scale; and power-loom factories, print-works, machine shops, bleach-fields, ship-building yards, &c. are in operation in the town and vicinity. At the St James' Day Fair, horse-races, originated by act of the bailies of the burgh in 1608, are held. Pop. (1871) 48,257.

PAKS, a market-town of Hungary, in the county of Tolna, 60 miles south-east of Peth, on the Danube. The river is here very winding, and the eastern bank a desert and useless morass. The town is frequently subject to inundations. Pop. (1869) 9484.

PALACE, this title is applied, with few exceptions, in this country to houses occupied by royal personages only. In Italy the name is given to all fine dwellings.

PALACKY, Frantisek, a Bohemian philologist, critic, and historian, was born 14th June 1798 at Hodslavitz, in Moravia, and studied at Presburg and Vienna, confining his attention chiefly to philological and historical investigations. In 1831 he was appointed by the states of Bohemia historiographer to that country, and was intrusted with the compilation of a general history of Bohemia. In furtherance of this work, he ransacked all the libraries and archives in Bohemia, and made long visits to Germany and Italy in search of materials. He took part in the political agitation of 1848, and was the leader of the Slav or national party as opposed to the German at the Diet of Kremsier, after the dissolution of which he returned to his literary labors. His great and justly celebrated work, "History of Bohemia" (in German and Bohemian, Prague, 1836—1867, 5 vols.), was received with enthusiasm by the whole Bohemian nation. Besides an early treatise on aesthetics, P. published many volumes of documents pertaining to Bohemian history, and a series of monographs on the same subject; a work on the most ancient monuments of the Czech tongue; an account of a literary tour to Italy in 1837; and in 1873 his "Political Testament." "Father P.," as he was fondly called by his Czech fellow countrymen, was beloved by them as the first to give access to the real history of Bohemia; and though himself a Protestant, was regarded by Catholics with perfect confidence. Throughout life a zealous contender for the crown rights of Bohemia, he persistently but vainly opposed the reconstruction of Austria on a German-Hungarian basis, and when in 1861 he was elected into the Austrian House of Lords, he declined to attend. He died in May 1876.

PA'LADIN, a term originally derived from the Counts Palatine, or of the Palace (see PALATINE), who were the highest dignitaries in the Byzantine court, and thence used generally for a lord or chieftain, and by the Italian romantic poets for a knight-errant.

PALÆA'STER (Gr. ancient star-fish), a genus of star-fish peculiar to the Silurian period, which in general appearance resemble the living brittle stars, but when more minutely examined, present so many anomalies, that they cannot be referred to any existing family. Five or six species have been described.

**PALÆOGRAPHY** (Gr. *palaïos*, old, and *graphé*, writing), the science of ancient writings. It comprehends not merely the art of reading them, but such a critical knowledge of all their circumstances as will serve to determine their age, if they happen to be undated, and their genuineness, in the absence of any formal authentication. For these purposes, the palaeographer needs to be acquainted with the various substances, such as bark, leaves, skins, paper, &c., which have been used for writing; with the various manners of writing which have prevailed, and the changes which they have undergone; with the various forms of authenticating writings, such as seals, signets, ciphers, signatures, superscriptions, subscriptions, attestations, &c., which have been employed at different times; with the various phases through which the grammar, vocabulary, and orthography of the language of the writing with which he is dealing, has passed; and with more or less, as the case may be, of the history, laws, institutions, literature, and art of the age and country to which the writing professes to belong.

Palaeography may be said to have been founded by the learned French Benedictine, Jean Mabillon, whose "*De Re Diplomatica*," first published in 1681 in 1 vol. fol., reprinted in 1700, and again in 1780, in 2 vols. fol., is still, perhaps, the most masterly work on the subject. Along with the "*Nouveau Traité de Diplomatique*" (Par. 1750—1765, 6 vols. 4to) of the Benedictines of St Maur, and the "*Éléments de Paléographie*" (Par. 1838, 2 vols. 4to) by M. Natalis de Wailly, it is the great authority for French palaeography. English palaeography is perhaps less favourably represented in Astle's "*Origin and Progress of Writing*" (Lond. 1803), than Scottish palaeography in Anderson's and Ruddiman's "*Diplomata Scotiæ*" (Edin. 1739). Muratori treats of Italian palaeography in the third volume of his great work, the "*Antiquitates Italicae Medii Ævi*," and among later works on the same subject may be mentioned the "*Diplomatica Pontificia*" (Rome, 1841) of Marino Marini. The palaeography of Greece is illustrated in the "*Palaeographia Græca*" (Par. 1708) of Montfaucou. Spanish palaeography may be studied in the "*Bibliotheca de la Polygraphia Española*" (Mad. 1738) of Don C. Rodríguez. Of works on German palaeography, it may be enough to name Eckard's "*Introductio in Rem Diplomaticam*" (Jen. 1742), Heumann's "*Commentarii de Re Diplomatica*" (Norimb. 1745), Walther's "*Lexicon Diplomaticum*" (Gott. 1745), and Kopp's "*Palaeographia Critica*" (Mann. 1817). Hebrew palaeography has been elaborated by Gesenius in his "*Geschichte der Hebräischen Sprache und Schrift*," and other works. The great work on palaeography generally—one of the most sumptuous works of its class ever published—is the "*Paléographie Universelle*" (Par. 1839—1845, in 5 vols. fol.) of M. J. B. Silvestre. See **BLACK LETTER**, **CONTRACTIONS**, **PALIMPSEST**, **PAPYRI**.

**PALÆOLOGUS**, the name of an illustrious Byzantine family, which first appears in history about the 11th c., and attained to imperial dignity in the person of MICHAEL VIII. in 1260. This emperor successfully undertook many expeditions to Greece and the Archipelago, and used his utmost endeavors to heal the schism between the Roman and Greek Churches, though with exceedingly little success. His successor on the throne was his son ANDRONICUS II. (1282—1292), under whose reign the Turks commenced in earnest a series of assaults on the Byzantine dominions. Andronicus attempted to oppose them with a force composed of mercenaries, but his success was very doubtful, as these troops, with perfect impartiality, attacked both his enemies and his subjects. To pay them he was compelled to levy such imposts as went far to destroy Byzantine commerce. He associated his son, MICHAEL IX. with himself in the government, and was dethroned by his grandson, ANDRONICUS III. (1282—1341), an able warrior and wise ruler, who repeatedly defeated the Bulgarians, Tartars of the Golden Horde, and the Servians, and diminished the oppressive imposts of the previous reign. He was, however, unsuccessful against the Catalans in Greece, and the Turks during his reign ravaged Thrace as far as the Balkan. He was greatly esteemed by his subjects, and well merited the title of "Father of his Country," which they bestowed upon him. His son, JOHN VI. (1355—1391), a weak and voluptuous prince, attempted in vain, both by force and bribery to stop the progress of the Turks; at last the pope, moved by his urgent entreaties, which were backed by a promise to submit the Greek Church to his (the pope's) supremacy, urged the Hungarians and Servians to arm in defence of the Greek emperor, but the result was only an additional triumph to Sultan Amur-

rath. The imbecile emperor was several times deposed, and on his final reinstatement by the sultan, acknowledged himself as his vassal for the capital and a small tract along the Propontis and Black Sea. Indeed, so degraded had the Byzantines become, that they obeyed the Sultan Bajazet's summons to aid him in reducing Philadelphia, the last Greek stronghold in Asia Minor. His son, **ANDRONICUS IV.** (1355—1378), who had been associated with him in the government, died in exile. **MANUEL II.** (1391—1425) pursued the same tactics as his father John VI., and with the same result. The allied army of the Hungarians, Germans, and French, which he had summoned to his aid against the Turks, was totally routed at Nicopolis by Bajazet, and Constantinople itself closely besieged. The invasion of Asia Minor by Timur, however, compelled the sultan to withdraw his whole force, and his subsequent defeat and capture at Angora in 1402, and the contests among his sons for the supremacy, gave the Greek empire a breathing space. Having aided Mohammed I. in his contests with his brothers, Manuel was, by the grateful sultan, presented with some districts in Greece, Thessalonica, and on the Euxine. **JOHN VII.** (1425—1449), on being pressed by the Turks, again held out to the pope the old bait of the union of the Greek and Western Churches under his sway, and even presented himself at the council of Florence, where, in July 1439, the union of the churches was agreed to. But on his return to Constantinople, the opposition of the Greek ecclesiastics to the union, supported by the people, rendered the agreement of Florence a dead letter. The pope, however, saw that it was for his interest to fulfil his part of the agreement, and accordingly stirred up Vladislas of Hungary to attack the Turks (see **JAGELLONS**), but this act only hastened the downfall of the **PALÆOLOGI**. John's brother, **CONSTANTINE XIII.** (1449—1453), a heroic action of a degenerate race, accepted the crown after much hesitation, knowing his total inability to withstand the Turks, and even then took the precaution of obtaining the sultan's consent before he exercised the imperial authority; but some rebellions in Carmania which now occurred, baffling Sultan Mohammed II.'s efforts to quell them, the emperor was willingly persuaded by his rash advisers that the time had now arrived for rendering himself independent of the Turks. The attempt, however, only brought swifter destruction on the wretched remnant of the Byzantine empire, for Mohammed invested the capital by sea and land, and after a siege, which lasted from 6th April to 29th May 1453, Constantinople was taken by storm, and the last of the **PALÆOLOGI** fell fighting bravely in the breach. A branch of this family ruled Montferrat in Italy from 1306, but became extinct in 1533. The **PALÆOLOGI** were connected by marriage with the ruling families of Hungary, Servia, and the last of the family married Ivan, Czar of Russia—a fact which the Czsars of Russia have persisted till lately in bringing forward as a claim in favor of their pretensions to the possession of European Turkey. It is said that direct descendants of the **PALÆOLOGI** exist to the present day in Franco. (For further information, see the separate articles on some of the emperors, and **BYZANTINE EMPIRE**.)

**PALÆONISCUS** (Gr. ancient sea-fish), a genus of ganoid fish, with a fusiform body, covered with rhomboid scales, a heterocercal tail, and moderately-sized fins, each furnished with an anterior spine. The single dorsal fin is opposite to the interval between the anal and ventral fins. Twenty-eight species have been described from the Carboniferous and Permian measures.

**PALÆONTOLOGY** (Gr. science of fossil animals) is that division of Geology (q. v.) whose province it is to inquire into the evidence of organic life on the globe during the different bygone geological periods, whether this evidence arises from the actual remains of the different plants and animals, or from recognisable records of their existence, such as footprints, Coprolites (q. v.), &c.

The metamorphic action which has so remarkably altered the oldest sedimentary rocks, is sufficient to have obliterated all traces of organic remains contained in them. Fossils are consequently extremely rare in these older palæozoic strata, and indeed it is only after long search, and within a recent time, that undoubted remains have been found in the Laurentian rocks. We were unable to record their existence in the article **LAURENTIAN SYSTEM**; but in the article **LIMESTONE**, we referred to the existence of beds of limestone as requiring the presence of animal life for their production. It is true that in 1852 an organic form resembling a coral was found in the limestone of the Ottawa, but much doubt was always entertained regarding

this solitary discovery. In 1863, however, there was detected an organism in the serpentine limestone of Grenville, of true Laurentian age, which Dr Dawson describes as that of a Foraminifer, growing in large sessile patches after the manner of *Carpentaria*, but of much greater dimensions, and presenting minute points, which reveal a structure resembling that of other foraminiferal forms, as, for example, *Calcarina* and *Nummulina*. Large portions of the limestone appear to be made up of these organisms, mixed with other fragments, which suggest comparisons with crinoids and other calcareous fossils, but which have not yet been distinctly determined. Some of the limestones are more or less colored by carbonaceous matter, exhibiting evidences of organic structure, probably vegetable. In this single Foraminifer, and the supposed coral, we have all that is positively known of the earliest inhabitants of our globe, with which we are yet acquainted. That these are but the smallest fraction of the fauna of the period in which they lived, is evident from the undetermined fragments associated with them, as well as from the extensive deposits of limestone of the same age. And that contemporaneous with them, there existed equally numerous representatives of the vegetable kingdom, cannot be doubted, when it is remembered that the animal can obtain its food only through the vegetable, and not directly from inorganic materials. Besides, their remains apparently exist in the limestone at Grenville, a rock which, from its very nature, rarely contains vegetable fossils.

The Cambrian rocks, though of immense thickness, have hitherto yielded indications of only a very few animals, but these have a special interest, as they are the oldest fossil remains yet detected in Britain. They consist of an impression which Salter considers to be portion of a trilobite, named by him *Palæopyge*, of the burrows and tracks of sea-worms, and of two species of radiated zoophytes called *Oldhamia*—animals which in this case also can be nothing more than the most fragmentary representations of the fauna of the period. No indications of vegetable life have yet been noticed in the Cambrian rocks, for we cannot consider the superficial markings on some of these strata as having anything to do with fuel.

Undoubted representations of the four invertebrate sub-kingdoms early make their appearance in the Silurian strata, and the occurrence before the close of the period of several fish, adds to them the remaining sub-kingdom—the vertebrata. If we except the silicious frustules of Diatomaceæ which are said to have been detected in these rocks, no satisfactory traces of plants have yet been observed, although extensive layers of anthracitic shales are common. Of the lower forms of the animal kingdom, some sponge-like bodies have been found, and corals are remarkably abundant, chiefly belonging to the order *Rugosa*, a palæozoic type, the members of which have horizontal tabulæ, and vertical plates or septa, either four in number, or a multiple of four. Graptolites, another family of zoophytes, flourished in the dark mud of the Silurian seas, and did not survive the period. All the great divisions of the Mollusca are represented by numerous genera, several of which are not very different from some living forms. A few true star-fishes have left their records on the rocks, but the most striking feature in the Echinodermata of the period is the Cystideæ, or armless sea-lilies, which, like the Graptolites, did not pass beyond the Silurian seas. Tubes, tracks, and burrows of annelids have been observed; and numerous Crustacea, belonging, with the exception of one or two shrimp-like species, to the characteristic palæozoic Trilobite, of which the number of individuals is as remarkable as the variety of species and genera. It is only in the upper portion of the group (the Ludlow beds) that the fish remains have been found. These have been referred to six different genera, and are chiefly loricate ganoids, of which *Cephalaspis* is the best known.

The rocks of the Old Red Sandstone period supply the earliest satisfactory remains of plants. The Ferns, Sigillaria, Lycopodites, and Calamites, so abundant in the Coal Measures, make their appearance among the newer of these beds, and even fragments of dicotyledonous wood have been observed. The various sections of the invertebrata are well represented, but the remarkable characteristic in the animal life of the period is the abundance of strange forms of heterocercal-tailed fish, whose buckler-shields, hard scales, or bony spines occur in the greatest abundance in some beds. The reptiles and reptile tracks in the Red Sandstone of Moray, originally referred here, are now universally considered as belonging to the New Red measures.

The striking feature in the rocks of the Carboniferous period is the great abundance of plants, the remains of which occur throughout the whole series, the coal-beds being composed entirely of them, the shales being largely charged with them, the sandstones containing a few, and even the limestones not being entirely without them. These plants were specially fitted for preservation, the bulk of them being vascular cryptogams, a class which Lindley and Hutton have shewn by experiment to be capable of long preservation under water. They are chiefly ferns; some are supposed to have been arborescent lycopods, while others (*Sigillaria Calamites*, and *Asterophyllites*) are so different from anything now known, that their position cannot be definitely determined, though it is most probably among the higher cryptogams. Several genera of conifers have been established from fossilised fragments of wood; and some singular impressions, which look like the flowering stems of dicotyledonous plants, have been found. The limestones are chiefly composed of crinoids, corals, and brachiopodous shells. The corals attain a great size, and the crinoids are extremely abundant, their remains making sometimes beds of limestone 1000 feet thick, and hundreds of square miles in extent. Many new genera of shells make their appearance. The trilobites, which were so abundant in the earlier rocks, are reduced to one or two genera, and finally disappear with this period. Fish with polished bony scales are found; and others, like the Port Jackson shark, with pavements of flat teeth over their mouth and gullet, fitting them to crush and grind the shell-protected animals on which they fed. Strange fish-like reptiles existed in the seas, and air-breathing species have been found on the continent and in America. The wing-cases, and parts of the bodies of insects, have also been found.

The Permian period is remarkable for the paucity of its organic remains, but this may arise from our comparative ignorance of its strata. The plants and animals are on the whole similar to those found in the Carboniferous measures, and a great proportion of them belong to the same genera. Many ancient forms do not pass this period, as the *Sigillaria* among plants, and the *Prodrueta* among animals.

The red sandstones of the Triassic period are remarkably destitute of organic remains—the iron, which has given to them this color, seems to have been fatal to animal life. In beds, however, on the continent, in which the iron is absent, fossils abound. These fossils present a singular contrast to those met with in the older rocks. The Palæozoic forms had been gradually dying out, and the few that were still found in the Permian strata do not survive that period, while in their place there appear in the Trias many genera which approach more nearly to the living forms. Between the organisms of the Permian and Triassic periods there exist a more striking difference than is to be found between those of any previous periods. Looking at this life-character, the rocks from the Permian downwards have been grouped together under the title Palæozoic; while from the Trias upwards the whole of the strata have received the name of Neozoic.

The extensive genera of *Ammonites* and *Belemnites* make their first appearance in the Trias. Several new forms of Cestracloft fish occur, and the reptiles increase in number and variety; among them is the huge batrachian *Labyrinthodon*, and the singular fresh-water tortoise, *Dicynodon*. The bird-tracks on the sandstones of Connecticut are by some referred to this age. Small teeth of mammalia, believed to be those of an insectivorous animal, like the *Myrmecobius* of Australia, have been found in the Keuper beds of Germany and Somerset.

In the Oolitic series we have an abundance of organic remains, in striking contrast to the scanty traces in the Permian and Triassic periods. Many new genera of ferns take the place of the Palæozoic forms, and a considerable variety of Conifers make their appearance, some of which have close affinities with living species, one, indeed, being referred to a still existing genus. The same approximation to living types is to be found in the animal kingdom. Several of the foraminifers are referred to living genera. Among the corals, the representatives of two living families make their appearance. No new genera are found among the Brachiopoda; but the Conchifera and Gasteropoda shew a great addition of new genera, some of which are still represented by living species, while not many new genera were added to the Cephalopoda, though they were individually very abundant. In some places the Lias shale consists of extensive pavements of *Belemnites* and *Ammonites*. The Crinoids give place to the increasing variety of sea-urchins and star-fishes. Num-

bers of insects have been found. The Cestracients continue to be represented in the Oolitic seas, but with them are associated several true sharks and rays; and the homocercal-tailed fish become numerous. Labyrinthodont reptiles abound; the huge Megalosaur and its companions occupied the land; while the seas were tenanted with the remarkable Ichthyosaur and Plesiosaur, and the air with the immense bat-like Pterodactyle. Seven genera of Mammalia have been found, all believed to be small carnivorous or insectivorous marsupials, except the Stereognathus, which Owen considers to have been a placental mammal, probably hoofed and herbivorous.

In the Cretaceous beds, which are chiefly deep-sea deposits, the remains of plants and land animals are comparatively rare. The Wealden beds, however, which had a fresh-water origin, contain the remains of several small marsupials, some huge carnivorous and herbivorous reptiles, a few fresh-water shells, and some fragments of drift-wood. The true chalk is remarkably abundant in the remains of foraminifera—indeed, in some places, it is composed almost entirely of the shells of these minute creatures. Of the mollusca, the Brachiopoda are in some beds very abundant; the Conchifera introduce several new forms, the most striking of which is the genus Hippurites, which with its allies did not survive this period; the cephalopodous genera which appeared in the Oolite, continue to abound in the chalk, many new forms being introduced; while others disappear with the period, like the Belemnites and Ammonites. Sea-urchins become still more numerous. In some beds the remains of fish are abundant, and while cartilaginous species still exist, the bony fishes become more numerous; and among them the family to which the salmon and cod belong makes its appearance. Reptiles are common in the Wealden, and the flying Pterodactyles attained a greater size, and were probably more numerous than in the former period. The remains of a single bird has been obtained from the greensand, but with this exception, birds as well as mammals have left no traces that have yet been found in the Cretaceous beds, though doubtless they existed.

In the Tertiary strata, the genera are either those still living, or forms very closely allied to them, which can be separated only by the careful examination of the accurate scientific observer. The plants of the Eocene beds are represented by dicotyledonous leaves, and palm and other fruits. Foraminifera are remarkably abundant, whole mountain masses being formed of the large genus Nummulites. Brachiopoda are rare, but Conchifera, Gasteropoda, and Cephalopoda increase in number; the new forms being generically almost identical with those now living. The principal living orders of fish, reptiles, and birds are represented in the Eocene strata. A considerable variety of pachydermatous mammals, suited apparently to live on marshy grounds and the borders of lakes, have been found in France and England, and associated with them are some carnivorous animals, whose remains are, however, much rarer. An opossum has been found at Colchester. The fragments belonging to the supposed monkey are portions of a small pachyderm, *Hyrachtherium* (q. v.).

Little need be said of the invertebrata of the Miocene period, beyond remarking their growing identity in genera with the living forms. Among the mammals, the *Quadramania* make their first appearance. The true elephant and the allied mastodon are represented by several species; a huge carnivorous whale has been discovered, and several Carulivora and deer, with a huge edentate animal, have been described. Owen thus speaks of these animals: "Our knowledge of the progression of Mammalian life during the Miocene period, teaches us that one or two of the generic forms most frequent in the older Tertiary strata still lingered on the earth, but that the rest of the Eocene Mammalia had been superseded by new forms, some of which present characters intermediate between those of Eocene and those of Pliocene genera."

In passing upwards through the Tertiary strata, the organic remains become more and more identical with living forms, so that when we reach the Pliocene and Pleistocene periods, the great proportion of the invertebrata are the same species which are found occupying the present seas. Among the higher orders of animals, the life of a species is much shorter than in the lower, and consequently, though the vertebrata approach so nearly to existing forms as for the most part to be placed in the same genera, yet the species differ from any of the living representatives of the different genera.

The Suffolk "Crag," which are the only British representatives of the Pliocene



**Palaopyge**  
**Palaia**

990

period, contain the relics of a marine testacea, that differs little from the present tenants of the European seas, between 60 and 70 per cent. being the same species. The ear-bones of one or more species of Cetacea have been found, and at Antwerp, the remains of a dolphin have been discovered in beds of this age.

The various local deposits which together form the Pleistocene strata, the latest of the geological periods, contain a great variety of organic remains. In the submarine forests, and in beds of peat, the stumps of trees are associated with the remains of underwood and herbaceous plants of species still living. Nearly all the mollusca and other marine invertebrata still survive. It is among the vertebrata that the most remarkable forms appear—forms which in the main differ little from the existing race of animals except in their enormous size. Elephants and rhinoceroses, fitted for a cold climate by their covering of long coarse hair and wool, roamed over the northern regions of both the Old and the New World, and were associated with animals belonging to genera which still exist in the same region, as bears, deer, wolves, foxes, badgers, otters, wolverines, weasels, and beavers, besides others whose representatives are now found further south, as the hippopotamus, tapir, and hyena. Contemporary with these, there lived in South America a group of animals which were types in everything but in size of the peculiar existing fauna of that continent. Among these were gigantic sloth-like animals, fitted to root up and push down the trees, instead of climbing to strip them of their foliage, like the sloth. The armadillo was represented by the huge Glyptodon, whose body was protected by a strong tessellated coat of mail. The species of fossil tapirs and peccaries are more numerous than their living representatives. The lamas were preceded by the large Macrauchenia, and the opossums and platyrhine monkeys were also prefigured by related species. Besides these, there have been found the remains of two mastodons and a horse, none of which are represented by any indigenous living animal in South America. The peculiar group of animals confined to Australia were prefigured by huge marsupials, some having close analogies to the living kangaroos and wombats, while others were related to the carnivorous native tiger. The gigantic wingless birds of New Zealand correspond in type with the anomalous apteryx, now existing only on these islands.

Associated with the remains of elephants, mastodons, cave-bears, and cave-hyenas, there have been found, in England and France, numerous specimens of flint implements, which are undoubtedly the result of human workmanship, and shew at least that man was contemporaneous with these extinct animals. If more certain evidence were needed of this, it has been obtained in the discovery of flint implements, bone implements fashioned and carved by means of the flint knives, the horns of a reindeer, two kinds of extinct deer, *Bos primigenius*, and other animals, associated with numerous bones of man, included in the breccia of the cave of Bruniquet in France. Owen considers the evidence of the contemporaneity of the various remains as conclusive. The several human skulls which have been obtained shew, according to the same authority, no characters whatever indicative of an inferior or transitional type. There are no certain data to give probability to the guesses which have been made as to the number of years which have elapsed since these deposits in which the relics of man occur were formed. The whole inquiry, moreover, is so recent, and the accumulation of facts is almost every day going on, that it would be premature to speak dogmatically on the subject.

**PALÆOPYGÆ** (Gr. ancient rump), a genus of fossil Crustacea, founded on a single impression from the surface of a bed in the Longmynd, of Cambrian age. Salter believes it to be the cephalic shield of a trilobite, but it may be only an accidental marking. If it be the impression of an organism, it is so distorted and imperfect that little can be made of it; its peculiar interest arises from its being associated with the earliest forms of life that have been observed on the globe.

**PALÆOSAURUS** (Gr. ancient lizard), a genus of fossil saurian reptiles peculiar to the Permian period. The remains of two species occur in the dolomitic conglomerate at Redland, near Bristol. The teeth were more or less compressed, and were furnished with serrated cutting margins. The vertebrae were biconcave, and had a remarkable depression in the centre of each vertebra into which the spinal canal was sunk. The leg-bones shew that the Palæosaurs were fitted for moving on the land. Owen thus exhibits their affinities: "In their thecodont type of dentition,

biconcave vertebrae, double-jointed ribs, and proportionate size of the bones of the extremities, they are allied to the Teleosaurus, but with these they combine a Dinosaurian femur, a lacertian form of tooth, and a crocodilian structure of pectoral and probably pelvic arch."

**PALÆOTHERIUM** (Gr. ancient wild beast), a genus of pachydermatous mammalia whose remains occur in the Eocene beds of England and the continent. At least ten species have been described, ranging in size from that of a sheep to that of a horse. The upper Eocene gypseous quarries of Montmartre supplied the first scanty materials, which Cuvier, by a series of careful and instructive inductions, built up into an animal, whose fidelity to nature was afterwards verified by the discovery of a complete series of fossils. In general appearance the Palæotherium resembled the modern tapir, and especially in having the snout terminating in a short proboscis. It had three toes on each foot, each terminated by a hoof.—The formula of the teeth is the same as that of the Hyracother, viz.,

$$\begin{array}{cccc} 3-3 & 1-1 & 4-4 & 3-3 \\ \text{I. } \frac{\quad}{\quad}, \text{C. } \frac{\quad}{\quad}, \text{P. M. } \frac{\quad}{\quad}, \text{M. } \frac{\quad}{\quad} = 44; \\ 3-3 & 1-1 & 4-4 & 3-3 \end{array}$$

but the structure of the molars approaches nearer to the molars of the rhinoceros. It is supposed that animals of this genus dwelt on the margins of lakes and rivers, and that their habits were similar to those of the tapir.

**PALÆOZOIC** (Gr. ancient life), the name given to the lowest division of the fossiliferous rocks, because they contain the earliest forms of life. They were formerly, and are still generally, known as the Primary rocks. The strata included under these titles are the Laurentian, Cambrian, Silurian, Old Red Sandstone, Carboniferous, and Permian systems. Phillips, for the sake of uniformity, introduced Mesozoic as equivalent to Secondary, and Neozoic to Tertiary rocks.

**PALÆOSTRA**, a building for gymnastic sports.

**PALAFOX Y MELZI**, Don José de, Duke of Saragossa, a Spanish patriot, was born in 1780 of a distinguished Aragonese family, and received an excellent education. He accompanied Ferdinand VII. to Bayonne, and on seeing him made a prisoner there, fled to Saragossa, where he exerted himself to prevent the invasion of Aragon by the French. His defence of Saragossa (q. v.), 27th July 1808—21st February 1809, which only yielded to the French after a second investment, is one of the most brilliant and heroic incidents in modern history, and has conferred lasting glory on P. and the whole city. The ancient fame of the Spaniards for obstinate valor in the defence of walled cities was rivalled, if not surpassed, and Saragossa could proudly claim to vie with Numantia. P., sick and exhausted, was taken prisoner and conveyed by the ungenerous French to the dungeons of Vincennes, where he was treated with great harshness. Released in 1813, he returned to Spain, and was appointed in the following year captain-general of Aragon. P. was no great politician, but he loved liberty and hated anarchy, and on more than one occasion he supported the former and crushed the latter. After being created Duke of Saragossa, and Grandee of Spain of the first class in 1836, he kept himself apart from politics. He died at Madrid 16th February 1847.

**PALAIS ROYAL**, a heterogeneous mass of buildings on the eastern side of the Rue Richelieu in Paris, composed of a palace, theatre, public gardens, bazaars, shops, cafés, and restaurants. The old palace was built between 1624 and 1686 on the site of the Hôtel Rambouillet by Cardinal Richelieu, who at his death bequeathed it to Louis XIII. Henrietta of France, widow of Charles I., and Anne of Austria, the queen mother, afterwards lived in it for a time with her young son, Louis XIV. It subsequently became the town residence of the Orleans branch of the Bourbons, and during the minority of Louis XV. it acquired a scandalous notoriety as the scene of the wild orgies in which the regent, Duke of Orleans, and his dissolute partisans were wont to indulge; while in the time of his son, Philippe Egalité, it became the focus of revolutionary intrigue, and the rendezvous for political demagogues of every shade of opinion. This prince, partly to repair his impoverished fortune, and partly to persuade the sans-culottes of Paris of the sincerity of his professed sympathy with their striving for equality, converted part of his

gardens into a place of public resort, and the pavilions of the great court into bazars, which were divided into shops and stalls. On the downfall of *Égalité*, the P. R. was taken possession of by the republican government, and used for the sittings of the tribunes during the Reign of Terror. On the restoration of the Bourbons, it reverted to the Orleans family, and was occupied by Louis Philippe till his election to the throne of France in 1830, when it was incorporated in the general domains of the state, and ceased to be an appanage of the House of Orleans. The palace was sacked by the mob during the Revolution of 1848, when many of its best paintings and most precious works of art were destroyed. After having been temporarily appropriated to various public purposes, it was thoroughly repaired and magnificently furnished, and given by the late emperor, in 1855, to his uncle Jerome Bonaparte, whose son Prince Napoleon resided there until 1871. The main entrance, with its elegant facade, is in the Rue St Honoré; and on passing through the first court, the second or Cour Royale is reached, to the left of which stands the Théâtre Français, while immediately facing it is the celebrated Galerie Vitrée, or Glass Gallery, which contains on the ground floor some of the most brilliant shops of Paris, while the upper stories are chiefly occupied by cafés and restaurants. The garden, which is surrounded by this and other galleries, measures 700 feet by 300. The Red Republicans set fire to the palace in March 1871 (see *PARIS*), when all the apartments occupied by Prince Napoleon were destroyed. The firemen and those who aided them, while forming into line to pass buckets of water, were fired upon by the insurgents; but kept to their work, and succeeded in checking the flames before they spread to the galleries and shops, which may almost be said to have remained intact. In the autumn of 1873 that part of the palace injured by the insurgents was restored. The garden, with its avenues and parterres, fountains and grass plots, still constitutes one of the liveliest and most frequented spots in the whole city; and although much of their glory has faded, its cafés still maintain, in great measure, the world-wide reputation they long ago acquired.

**PALANQUIN**, or *Palki*, the vehicle commonly used in Hindustan by travellers, is a wooden box, about 8 feet long, 4 feet wide, and 4 feet high, with wooden shutters which can be opened or shut at pleasure, and constructed like Venetian blinds for the purpose of admitting fresh air, while at the same time they exclude the scorching rays of the sun, and the heavy showers of rain so common in that country. The furniture of the interior consists of a cocoa mattress, well stuffed and covered with morocco leather, on which the traveller reclines; two small bolsters are placed under his head, and one under his thighs, to render his position as comfortable as possible. At the upper end is a shelf and drawer, and at the sides are nettles of larger dimensions than the ordinary pockets in carriages, for containing those articles which may be necessary to the traveller during his journey. At each end of the palanquin, on the outside, two iron rings are fixed, and the *hannas*, or palanquin-bearers, of whom there are four, two at each end, support the palanquin by a pole passing through these rings. Travelling in this mode is continued both by day and night. (See *DAWK*.) The palanquin is also used at the present day in Brazil, with the prominent exception of Rio Janeiro.

Similar modes of travelling have been at various times in use in Western Europe, but only for short distances. The Roman "*litter*," the French "*chaise à porteurs*," and the "*sedan-chair*" were the forms of vehicle most in use, and the two latter were in general use in towns till they were superseded by hackney coaches. The Roman "*litter*" was one of the criteria of its owner's wealth, the rich man generally exhibiting the prosperous condition of his affairs by the multitude of the bearers and other attendants accompanying him.

**PALAPTERYX**, (Gr. *ancient apteryx*), a genus of fossil birds whose remains are found in the river-silt deposits of New Zealand, associated with the gigantic *Dinornis*, and which, like it, resembled in the form of the sternum, and the structure of the pelvis and legs, the living wingless apteryx. Two species have been described.

**PALATE**, The, forms the roof of the mouth, and consists of two portions, the hard palate in front and the soft palate behind. The framework of the *hard palate* is formed by the palate process of the superior maxillary bone, and by the horizontal process of the palatine bone, and is bounded in front and at the sides by the alveolar arches and gums, and posteriorly it is continuous with the soft palate. It is cor-

ered by a dense structure formed by the periosteum and mucons membrane of the month, which are closely adherent. Along the middle line is a linear ridge or raphe, on either side of which the mucons membrane is thick, pale, and corrugated, while behind it is thin, of a darker tint, and smooth. This membrane is covered with scaly epithelium, and is furnished with numerous follicles (the palatal glands). The *soft palate* is a movable fold of mucons membrane enclosing muscular fibres, and suspended from the posterior border of the hard palate so to form an incomplete septum between the mouth and the pharynx; its sides being blended with the pharynx, while its lower border is free. When occupying its usual position (that is to say, when the muscular fibres contained in it are relaxed), its anterior surface is concave; and when its muscles are called into action, as in swallowing a morsel of food, it is raised and made tense, and the food is thus prevented from passing into the posterior nares, and is at the same time directed obliquely backwards and downwards into the pharynx.

Hanging from the middle of its lower border is a small conical pendulous process, the *uvula*; and passing outwards from the uvula on each side are two curved folds of mucons membrane containing muscular fibres, and called the *arches* or *pillars of the soft palate*. The *anterior pillar* is continued downwards to the side of the base of the tongue, and is formed by the projection of the palato-glossus muscle. The *posterior pillar* is larger than the anterior, and runs downwards and backwards to the side of the pharynx. The anterior and posterior pillars are closely united above, but are separated below by an angular interval, in which the *tonsil* of either side is lodged. The *tonsils (amygdalæ)* are glandular organs of a rounded form, which vary considerably in size in different individuals. They are composed of an assemblage of mucons follicles, which secrete a thick grayish matter, and open on the surface of the gland by numerous (12 to 15) orifices.

The space left between the arches of the palate on the two sides is called the *isthmus of the fauces*. It is bounded above by the free margin of the palate, below by the tongue, and on each side by the pillars of the soft palate and tonsils.

As the upper lip may be fissured through imperfect development (in which case it presents the condition known as hare-lip), so also may there be more or less decided fissure of the palate. In the slightest form of this affection, the uvula merely is fissured, while in extreme cases the cleft extends through both the soft and hard palate as far forward as the lips, and is then often combined with hare-lip. When the fissure is considerable, it materially interferes with the acts of sucking and swallowing, and the infant runs a great risk of being starved; and if the child grows up, its articulation is painfully indistinct. When the fissure is confined to the soft palate, repeated canterisation of the angle of the fissure has been found sufficient to effect a cure by means of the contraction that follows each burn. As a general rule, however, the child is allowed to reach the age of puberty when the operation of *staphyloraphy* (or suture of the soft parts) is performed—an operation always difficult, and not always successful. For the method of performing it, the reader is referred to the "Practical Surgery" of Mr Fergusson, who has introduced several most important modifications into the old operation.

Acute inflammation of the tonsils, popularly known as *QUINSY*, is treated of in a separate article.

Chronic enlargement of the tonsils is very frequent in scrofulous children, and is not rare in scrofulous persons of more advanced age, and may give rise to very considerable inconvenience and distress. It may occasion difficulty in swallowing, confused and inarticulate speech, deafness in various degrees from closure of the eustachian tubes (now often termed *throat deafness*), and noisy and laborious respiration, especially during sleep; and it may even cause death by suffocation, induced by the entanglement of viscid mucus between the enlarged glands. Iodide of iron (especially in the form of Blancard's Pills) and cod-liver oil are the medicines upon whose action most reliance should be placed in these cases, while a strong solution of nitrate of silver (a scruple of the salt to an ounce of distilled water), or some preparation of iodine, should be applied once a day to the affected parts. If these measures fail, the tonsils must be more or less removed by the surgeon, either by the knife or scissors, or by a small *guillotine* specially invented for the purpose.

Enlargement or relaxation of the uvula is not uncommon, and gives rise to a constant tickling cough, and to expectoration, by the irritation of the larynx which it

occasions. If it will not yield to astringent or stimulating gargles, or to the stronger local applications directed for enlarged tonsils, its extremity must be seized with the forceps, and it must be divided through the middle with a pair of long scissors.

**PALATINATE**, a name applied to two German states, which were united previously to the year 1623. They were distinguished as the Upper and Lower Palatinate. The Upper or Bavarian P., now forming a circle of the kingdom of Bavaria, was a duchy, and was bounded by Baireuth, Bohemia, Neuburg, Bavaria, and the district of Nürnberg. Area, 2730 square miles; pop. (1807) 288,800. Amberg was the chief city, and the seat of government. The Lower P., or the Palatinate on the Rhine, embraced an area of from 3045 to 3150 square miles; and consisted of the electoral P., the principality of Simmern, the duchy of Zweibrücken, the half of the county of Sponheim, and the principalities of Beldenz and Lautern. For the area and population of the modern provinces of the Upper and Lower P., see article **BAVARIA**.

The counts of the electoral or Rhenish P. were established in the hereditary possession of the territory of that name, and of the lands attached to it, as early as the 11th century. After the death of Herman III., the Emperor Friedrich I. assigned the P. to Conrad of Swabia. After Conrad's death, his son-in-law, Duke Henry of Brunswick, came in 1196 into the possession of these lands, but he, having been outlawed in 1215 by Friedrich II., was succeeded by his son, Otto III., Duke of Bavaria. Ludwig II., or the Strong, succeeded the preceding in the P. in 1253, and was in turn succeeded in 1294 by Rudolf I., who, however, was banished by his brother, the Emperor Ludwig, because he had taken part with Friedrich of Austria. The country was ruled by his three sons. Ruprecht III., who died in 1410, was a German emperor. Of his four sons, Ludwig III. received the electoral or Rhenish P.; Johann, the Upper P.; Stephan, Zweibrücken; and Otto, Mosbach. The second and fourth lines soon died out, as well as also that of Ludwig III., which came to a close in 1559, upon which the possessions of that prince, together with the electorate, passed to Friedrich III. of the Simmern line. He was succeeded by Ludwig IV. in 1576, by Friedrich IV. in 1583, and by Friedrich V. in 1610, who, after he accepted the Bohemian crown, was driven from his possessions by the emperor in 1619, and his office of elector was transferred to Maximilian, Duke of Bavaria. Karl Ludwig, son of Friedrich V., received the Lower P. at the peace of Westphalia, and in his favor a new or eighth electorship was created. With his son Karl, the Simmern line terminated in 1685, upon which the P. fell into the hands of Philipp Wilhelm, count palatine of Neuburg.

The House of Neuburg was descended from Ludwig the Black, count palatine in Zweibrücken, second son of Stephan, count palatine in Simmern. Wolfgang, a descendant of Ludwig's, was the founder of all the other lines of counts palatine. Of his three sons, Johann founded the line of Neu-Zweibrücken, Karl the Birkenfeld line, Philipp Ludwig the Neuburg line. Philipp Ludwig had three sons, Wolfgang Wilhelm, August, and Johann Friedrich. The first founded the Neuburg line, the second the Sulzbach line, the third died childless. The son of Wolfgang Wilhelm died in 1690. His son, Johann Wilhelm, became heir to the Beldenz line in 1694. He was succeeded by his brother, Karl Philipp, who in turn was succeeded in 1743 by Karl Theodor, from the Sulzbach line, who united the Bavarian territories with the Palatinate. Duke Maximilian of Zweibrücken next succeeded in 1799, who at the peace of Lunéville (1801) was compelled to cede a portion of the Rhenish P. to France, a part to Baden, a part to Hesse-Darmstadt, and a part to Nassau. Treaties of Paris of 1814, and 1815 re-assigned the Palatinate lands beyond the Rhine to Germany, Bavaria receiving the largest share, and the remainder being divided between Hesse-Darmstadt and Prussia.

**PALATINE** (from Lat. *palatium*, a palace). A *Comes Palatinus*, or Count Palatine, was, under the Merovingian kings of France, a high judicial officer, who had supreme authority in all causes that came under the immediate cognizance of the sovereign. After the time of Charlemagne, a similar title was given to any powerful feudal lord, to whom a province, generally near the frontier, was made over with *fera regalia*, or judicial powers, similar to what the counts palatine had received in the palace, and the district so governed was called a *palatinate* or *county palatine*. There were three counties palatine in England—Lancaster, Chester, and Durham—

which were, no doubt, made separate regalities on account of their respective proximity to the frontier of Wales and to that turbulent Northumbrian province which could neither be accounted a portion of England nor of Scotland. In virtue of their regal rights, the counts palatine had their courts of law, appointed their judges and law officers, and could pardon treasons, murders, and felonies; all writs and judicial process proceeded in their names, and the king's writs were of no avail within the bounds of the palatinate. Lancaster seems to have been made a county palatine by Edward III. Henry, first Duke, and John, second Duke of Lancaster, were both invested by him with the dignity of count palatine. Henry VI. was hereditarily Duke and Count Palatine of Lancaster, and on his attainder, soon after Edward IV.'s accession, the duchy and county were forfeited to the crown, and confirmed on Edward IV.—afterwards on Henry VII. and his heirs for ever. The Queen is now Duchess and Countess Palatine of Lancaster. There is still a chancellor of the duchy and county palatine, whose duties are few and unimportant, but the administration of justice has gradually been assimilated to that of the rest of England. See LANCASTER. Chester is supposed to have become a county palatine when made over with regal jurisdiction by William the Conqueror to Hugues d'Avranches. In the reign of Henry III. it was annexed to the crown by letters patent, and since that time the earldom palatine of Chester has been vested in the eldest son of the sovereign, or in the crown, whenever there is no Prince of Wales. Durham seems to have first become a palatinate when William the Conqueror constituted Bishop Walcher Bishop and Duke of Durham, with power (according to William of Malmesbury) to restrain the rebellious people with the sword, and reform their morals with his eloquence. The Palatinate jurisdiction continued united with the bishopric till 1836, when it was separated by act of parliament, and vested in William IV. and his successors as a franchise distinct from the crown, together with all forfeitures, fines, and *jura regalia*. It has since been more completely incorporated with the crown. Pembroke was at one time a county palatine, but ceased to be so in Henry VIII.'s time. The Archbishop of York also exercised the powers of a palatine in the county of Hexham in Northumberland, of which he was deprived in the reign of Elizabeth. In very early times there were a number of similar privileges in Scotland, the most important of which was that of the Earls Palatine of Strathearn. In Germany, the *Pfalzgraf*, or count palatine, exercised a jurisdiction much more extensive than the simple *Graf* or count. A considerable district in Germany was long under the jurisdiction of a count palatine, who was one of the electors of the empire. See PALATINATE.

**PALATINE HILL.** (*Mons palatinus*), the central hill of the famous seven on which ancient Rome was built, and, according to tradition, the seat of the earliest Roman settlements. In point of historical interest, it ranks next to the Capitol and the Forum. Its summit is about 160 feet above the sea. The form of the hill is irregularly quadrangular. Its north-western slope, towards the Capitoline Hill and the Tiber, was called *Germalus* or *Cermalus*. The origin of the name is uncertain, although several derivations are given connecting it with legendary stories. Romulus is said to have founded the city upon this hill, and on Germalus grew the sacred fig-tree (near to the Luperal) under which he and his brother, Remus, were found sucking the she-wolf. Upon the P. H. were the temple of Jupiter *Stator*, the temple of Cybele, the sacred square enclosure called *Roma Quadrata*, and other sacred places and edifices, besides many of the finest houses in Rome. Augustus and Tiberius had their residences here, whence Tacitus termed it *ipæ imperii arx* (the very citadel of government); and at last Nero included it entirely within the precincts of his *aurea domus*, which Vespasian subsequently restricted to the hill. From the time of Alexander Severus it ceased to be the residence of the emperors, but the name *palace* (*palatinum*), derived from it, was given to the abodes of sovereigns and great princes, and has been adopted into modern languages. Recent excavations have brought to light numerous remains of the palatial and other structures with which the P. H. was once covered; and these are now among the most interesting sights of the eternal city.

**PALAWAN**, or Paragoa, one of the Philippine Islands (q. v.).

**PALE**, in Heraldry, one of the figures known as ordinaries, consisting of a perpendicular band in the middle of the shield, of which it is said to occupy one-third.

Several charges of any kind are said to be "in pale" when they stand over each other perpendicularly, as do the three Mous of England. A shield divided through the middle by a perpendicular line is said to be "parted per pale." The Pallet is the diminutive of the pale, and is most generally not borne singly. When the field is divided into any number of parts by perpendicular lines, it is called "paly of" so many pieces. Paly of six argent and gules, the arms of the family of Ruthven. When divided by lines perpendicular and bendways crossing, it is called paly bendy. An Endorse is a further diminutive of the pallet, and a pale placed between two endorses is said to be endorsed.

**PALAY** (*Cryptostegia grandiflora*), a climbing plant of the natural order *Asclepiadaceæ* (q. v.), common in many parts of India, particularly on the eastern coast of Hindustan. It yields a very fine strong white fibre, resembling flax, and which can be spun into the finest yarn. The fibre is obtained from the stalk; the milky juice contains caoutchouc. P. is one of the most interesting plants which have recently been recommended to notice in India.

**PALE**, in Irish history (see IRELAND, HISTORY), means that portion of the kingdom over which the English rule and English law was acknowledged. There is so much vagueness in the meaning of the term, that a few words of explanation appear necessary. The vagueness arises from the great fluctuations which the English authority underwent in Ireland at various periods, and from the consequent fluctuation of the actual territorial limits of the Pale. The designation dates from the reign of John, who distributed the portion of Ireland then nominally subject to England into twelve counties palatine, Dublin, Meath, Kildare, Louth, Carlow, Kilkenny, Wexford, Waterford, Cork, Kerry, Tipperary, and Limerick. To this entire district, in a general way, was afterwards given the designation of the Pale. But as it may be said that the term is commonly applied by the writers of each age to the actual English territory of the period, and as this varied very much, care must be taken to allude to the age of which the name Pale is used. Thus, very soon after the important date of the Statute of Kilkenny, at the close of the reign of Edward III., the English law extended only to the four counties of Dublin, Carlow, Meath, and Louth. In the reign of Henry VI., the limits were still further restricted. In a general way, however, the Pale may be considered as comprising the counties of Dublin, Meath, Carlow, Kilkenny, and Louth. This, although not quite exact, will be sufficient for most purposes.

**PALA'ZZOLO ACREI'DE**, a town of Sicily, in the province of Syracuse, 29 miles south-south-west of Catania, is situated on the brow of a hill, just where it overhangs a deep valley. Near P. are the remains of the ancient *Acra*, founded by a colony from Syracuse, on the site of a Phœnician settlement, 644 a.c. The most curious remains are to be found in some low cliffs beneath the town to the south, where is a series of arched niches, containing figures carved in high relief in the rock. The style of art appears to be archaic Greek, with somewhat of an Egyptian character. Pop. 9954.

**PA'LEA** (Lat. chaff), a term employed in Botany to designate the bracts of the *forætes* in Grasses (q. v.), called *corolla* by the older botanists; also to designate the small bracts or scales which are attached to the receptacle of the head of flowers in many of the *Compositæ* (q. v.). Any part of a plant covered with chaffy scales is described as *paleaceous*.

**PALEMBA'NG**, formerly an independent kingdom on the east coast of Sumatra, now a Netherlands residency, is bounded on the n. by Djambi, n. w. by Bencoolen, s. by the Lampong districts, and s. e. by the Strait of Banca, has an area of 61,900 square miles; and a population amounting, in 1873, to 577,085 souls. Much of the land is low-lying swamp, covered with a wilderness of impenetrable bush; but in the south it rises into mountains, of which Oeloe Moesi (Ulu Mndi) is 6180 feet. Gold-dust, iron-ore, sulphur with arsenic, lignite, and common coal are found; also clays suited for making coarse pottery, &c. Springs of pure oil occur near the coal-fields of Bail Boekit (Bukit), and of mineral water in various places. Rice, cotton, sugar, pepper, tobacco, and, in the interior, coco-nuts, are grown; the forests producing gutta-percha, gum-elastic, rattans, wax, benzoin, sattu-wood, &c. The rivers abound with fish; and the elephant, rhinoceros, tiger, panther, and leopard

roam the woods, as well as the deer, wild swine, and goats, with many varieties of the monkey.

In the dry season the thermometer ranges from 80° to 92° F., and in the rainy season 76° to 80°. The climate is not unhealthy, except in the neighborhood of the swamps. The natives are descended from Javanese, who in the 16th c., or earlier, settled in P., and ruled over the whole land. The race, however, has become mixed with other Malays, and the language has lost its purity. In the north-west interior is a tribe called the Koeboes (Kûbûs), of whose origin nothing is known, but who are probably the remainder of the aborigines. They do not follow after agriculture, go about almost naked, and live chiefly by fishing and hunting. No idea of a Supreme Being seems to be possessed by them, though they believe in existence after death.

PALEMBANG, the capital of the kingdom and residency, is 52 miles from the Soensang (Sunsang), or principal mouth of the river Moesi (Musi), in 2° 59' s. lat., and 104° 44' e. long. The city is built on both banks of the Moesi, and other streams which fall into it, and is five miles in length by half a mile in breadth. The river is upwards of 1000 feet broad, and from 40 to 50 feet in depth, so that the largest vessels can sail up to the harbor. The native houses are raised on posts, and neatly constructed of planks or bamboos; the Chinese, Arabians, and Europeans, chiefly living in floating houses called *rakite*, of which there are upwards of 500, and holding communication with one another and with the natives by boats. The fort is built on the left bank of the river, and behind it are an institution for the blind and a splendid mosque. There is a school, where 30 European children are educated, a government elementary school for natives, and several good Chinese schools. Many of the natives can read and write, and in 1856 a native printing-press was erected by Kemas Mohamed Asahel.

P. is visited annually by upwards of 30,000 boats of various sizes, bringing produce from the interior, consisting chiefly of rice, benzoin, gum-elastic, gutta-percha, raw cotton, rattans, tobacco, pepper, wax, dragon's blood, resin; and gold-dust from the boundaries of the kingdom of Djambi, now included in the Residency. These are obtained chiefly in exchange for salt, cotton manufactures, earthenware, iron and copper wares, and provisions. The foreign trade is large, and chiefly carried on with Java, Banca, Singapore, China, and Siam. The colonial report of the Dutch government, published in 1815, gives the exports from P. for 1812, at £227,825, and the imports at £278,693. The natives of P. are good ivory carvers, gold and silver smiths, jewellers, cutlers, japanners, painters, boat-builders, bookbinders, &c., and expert at all the ordinary handicrafts. The women, in addition to cotton fabrics, spinning, and dyeing, weave silk stuffs, embroidered with gold. Pop. 44,000, of whom 100 are Europeans, 30,000 Chinese, and 2000 Arabians.

PALENCIA (the ancient *Pallantia*), a city of Spain, in Old Castile, capital of the modern province of the same name, stands in a treeless, but well-watered and fruitful plain, on the Carrion, 30 miles north-east of Valladolid. It is a bishop's see, and is surrounded by old walls, 36 feet high and 9 feet thick, around which are pleasant promenades. The cathedral, a light and elegant Gothic edifice, was built 1321—1504. The first university founded in Castile was built here in the 10th c., but was removed to Salamanca in 1239. Nearly one-third of the population is employed in the manufacture of blankets and coarse woollen cloths. The position of the town on the Carrion, and on the Castilian Canal, is favorable to the development of commerce. The vine is cultivated, and there is a good trade in wool. Pop. 13,000.

PALE'NQUÉ, Ruins of, are on the Rio Chacamas, a branch of the river Usumacinta, in the state of Chiapas, Mexico, 8 miles south-east of the village of Santo Domingo de Palenque, lat. 17° 30' n., long. 92° 25' w. The ruins extend over a large area, covered with a dense tropical forest, and are of difficult exploration. They consist of vast artificial terraces, or terraced truncated pyramids, of cut stone, surmounted by edifices of peculiar and solid architecture, also of cut stone, covered with figures in relief, or figures and hieroglyphics in stucco, with remains of brilliant colors. Most of the buildings are of one story, but a few are two, three, and some may have been four stories. The principal structure, known as the Palace, is 228 feet long, 180 feet deep, and 25 feet high, standing on a terraced truncated pyramid of corresponding dimensions. It was faced with cut stone, cemented with mortar of lime and sand, and the front covered with stucco and painted. A corridor runs



around the building, opening into four interior courts, which open into many smaller rooms. On slabs of stone are carved numerous colossal figures, and the remains of statues more resemble Grecian than Egyptian or Hindu art. Other spacious and elaborately ornamented buildings appear to have been temples of religion. These ruins were in the same condition when Cortez conquered Mexico, as now, overgrown with a forest, and their site forgotten. They were only discovered in 1750. Three explorations were made by the Spanish government, but they were little known until visited by Messrs J. L. Stephens and F. Catherwood, and their account published with plans and drawings. See Stephens's "Incidents of Travel in Central America," &c., and Catherwood's "Views of Ancient Monuments of Central America," &c. There are in Mexico dim traditions of the existence, at a remote period, of the capital of a theocratic state, the centre of a long since extinguished civilisation, of which the only traces are these wonderful ruins and unexplained hieroglyphics.

**PALE'RM**O, an archiepiscopal city, important seaport, and the capital of the island of Sicily; capital also of the province of the same name, and along with Naples, Rome, Milan, and Turin, one of the five most populous cities in the kingdom of Italy, is situated on the north-east of the island, 135 miles by water west of Messina. Lat. 38° 6' n., long. 18° 20' e. It stands in a highly-cultivated and fertile plain called *La Conca d'Oro* (The Golden Shell), commands a beautiful view of the Gulf of Palermo on which it stands, and is backed towards the interior by ridges of mountains. In shape the town is an oblong parallelogram, the direction of its length being from south-west to north-east. It is divided into four quadrangular parts by two great streets, the beautiful *Via Vittorio Emanuele*, formerly the *Via Toledo* or *Cusacca*, and the *Strada Nuova* or *Maqueda*, which cross each other at right angles in the middle of the city. It is upwards of four miles in circumference, is surrounded by walls pierced with 12 gates and flanked with bastions, and is defended by several batteries. The houses are balconied, flat roofed, and have glass doors instead of windows. The streets, besides the two main thoroughfares already mentioned, are generally well laid out, and there are several fine promenades, of which the famous *Marina*, extending along the shore, on the line of the ancient fortifications, and bordered by the palaces of the nobles, is the most magnificent. P. contains 60 parish churches; 8 abbeys; 71 monasteries and convents, to which belong from 20,000 to 30,000 monks and nuns; and, besides these, 19 oratories. Under the churches is counted the cathedral—the church of St Rosalia. At the intersection of the two principal streets there is a large octagonal space or *Piazza*, lined with palaces, and adorned with statues and marble fountains. The royal palace is a huge pile of buildings, with a splendid chapel, built in 1192, and contains many pillars of rare workmanship and rich mosaics with Arabic inscriptions. The cathedral is a fine edifice, originally Gothic, but to which incongruous Greek additions have been made, is adorned with marble columns and statues, and contains monuments of the Emperor Frederick II. and of King Roger, the founder of the Norman monarchy in Sicily. Among the principal public institutions of P. are the university, an academy of arts and sciences, a medical academy, an institution for arts and antiquities, a beautiful and extensive public garden, public libraries, theatres, &c. P. is an archbishop's see, the residence of the governor of the island, and the seat of the supreme courts. Manufactures of silks, cottons, oil-cloth, leather, gloves, &c., are carried on. The harbor is formed by a mole, 1300 feet in length, on which there is a light-house and battery. Vessels of 700,000 tons enter and clear the port annually, and the imports amount in value to near £1,000,000, and the exports to about the same sum. Pop. (1871) of P. with suburbs, 156,406; of commune, 219,833.

The environs of P. are interesting as well as picturesque, and embrace many pleasant villas and noble mansions. North-west of the city is Monte Pellegrino, the Elysium of the ancients, an abrupt rocky mass, in which there is a grotto or cave, in which Santa Rosalia, a young Norman princess, lived a life of religious retirement. In P., Santa Rosalia is esteemed more highly than even Santa Maria; the festival in her honor lasts from the 9th to the 18th July, and is the most important festival held on the island. During its celebration the city is illuminated, the streets are gay and brilliant, and there is an immense influx of strangers from the vicinity. But the chief feature of the festival is the procession to the cave. An immense silver im-

age of the saint is borne thither on a wagon, 70 feet long, 30 feet broad, and 80 feet high. Its form resembles that of a Roman galley, with seats for a choir. The wagon is drawn by 56 mules, covered with the gayest trappings, and driven by 28 postillions.

P., the ancient *Panormus*, was originally a Phœnician colony, but had become a dependency of Carthage before the name occurs in history. With the exception of a short time about 276 B.C., when it fell into the hands of the Greeks, it continued to be the head-quarters of the Carthaginian power in Sicily, until it was taken by the Romans during the First Punic War (234 B.C.), when it became one of the principal naval stations of the Romans. The name *Panormus* is derived from the excellent anchorage (Gr. *hormos*), in the bay; but the Phœnician name found on coins is *Machanath*, meaning "a camp." The Vandals, and afterwards the Arabs, made it the capital of the island, and after the Norman Conquest it continued to be the seat of the king of Sicily. It still remained the royal residence under the Aragonese kings; but the court was removed after Sicily became united to the then kingdom of Naples. See SICILY.

PA'LESTINE (*Palaestina*, *Phlœstia*), or the Holy Land, a country of South-Western Asia, comprising the southern portion of Syria, and bounded on the w. by the Mediterranean, e. by the valley of the Jordan, n. by the mountain ranges of the Lebanon and the glen of the Lîâny (Leontes), and s. by the desert of Sinai; lat.  $31^{\circ} 15'$ — $33^{\circ} 20'$  n., long.  $34^{\circ} 30'$ — $35^{\circ} 30'$  e. Within these narrow limits, not more than 145 miles in length by 45 in average breadth—an area less than that of the principality of Wales—is comprised the "Land of Israel" or "Canaan," the arena of the greatest events in the world's history. The principal physical features of P. are, (1) a central plateau or table-land, with a mean height of 1600 feet, covered with an agglomeration of hills, which extend from the roots of the Lebanon to the southern extremity of the country; (2) the Jordan valley and its lakes; and (3) the maritime plain, and the plains of Esdraelon and Jericho. On the east, the descent from the central plateau is steep and rugged, from Lake Huleh to the Dead Sea. On the west, it is more gentle, but still well marked, towards the plains of Philistia and Sharon. The ascertained altitudes on this plateau, proceeding from south to north, are Hebron, 3029; Jerusalem, 2610; Mount of Olives, 2724; Mount Gerizim, 2700; Mount Tabor, 1900; Safed, 2775 feet above the sea. Nearly on the parallel of the Sea of Galilee, the range of Carmel extends from the central plateau north-west to the Mediterranean, where it terminates abruptly in a promontory surmounted by a convent. It rises from 600 feet in the west, to 1600 feet in the east, and is composed of a soft white limestone, with many caverns. Beyond the boundary of P. on the north, but visible from the greater part of the country, Mount Hermon rises to 9381 feet, and is always snow-clad. From the formation of the central plateau, the drainage is nearly always east and west to the Jordan and the Mediterranean. The streams of the plateau are insignificant, and generally dry in summer.

The geological formation of the country consists of jurassic and cretaceous limestone, often covered with chalk, and rich in flints, with occasional interruptions of tertiary, basaltic, and trappan deposits. The upper strata consist of limestone of a white or pale-brown color, containing few fossils, but abounding in caverns, which form one of the peculiarities of the country. The general features of the landscape exhibit soft rounded hills, separated by narrow glens or valleys of denudation; the strata are occasionally level, but more frequently violently contorted, as seen on the route from Jerusalem to Jericho, where the fissures are often 1000 feet deep, and only 30 or 40 feet wide. Ironstone occurs in small quantities; rock-salt, asphaltum, and sulphur abound near the Dead Sea, where, as also near the Sea of Galilee, there are many hot springs. Volcanic agency is evident in the obtruded lava of former ages, and in frequent earthquakes of modern times. The vast crevasses through which the Jordan flows, and which cleaves the land from north to south, is one of the most remarkable fissures on the surface of the globe; it is from 5 to 12 miles wide; and of the extraordinary depth of 2630 feet at the bottom of the Dead Sea. Through this the river descends at the rate of 11 feet in a mile, with a course so tortuous that it travels 132 miles in a direct distance of 64, between the Sea of Galilee and the Dead Sea. It is the only perennial river of P., except the Kishon, which is permanent only in its lower course, and the Lîâny on its northern border.

See JORDAN. The only lakes of P. are in the valley of the Jordan. See GENESARET, SEA OF, and DEAD SEA.

The plain of Philistia extends from the coast to the first rising ground of Judah, about 15 miles in average width; the soil is a rich brown loam, almost without a stone. It is in many parts perfectly level; in others undulating, with mounds or hillocks. The towns of Gaza and Ashdod, near the sea, are surrounded by groves of olives, sycamores and palms. This plain is still, as it always was, a vast corn-field, an ocean of wheat, without a break or fence; its marvellous fertility has produced the same succession of crops, year after year, for forty centuries without artificial aid. The plain of Sharon is about 10 miles wide in the south, narrowing towards the north, till it is terminated by the buttress of Carmel. Its undulating surface is crossed by several streams; the soil is rich, and capable of producing enormous crops; but only a small portion of it near Jaffa is cultivated, and it is rapidly being encroached on by the sea sand, which, between Jaffa and Cæsarea, extends to a width of three miles and a height of 800 feet. The famous ancient cities of this region, Cæsarea, Diospolis and Antipatris, have vanished. Jaffa (Joppa) alone remains, supported by travellers and pilgrims from the west on the way to Jerusalem. The great plain of Esdraelon, or Jezreel, extends across the centre of the country from the Mediterranean to the Jordan, separating the mountain-ranges of Carmel and Samaria from those of Galilee. Its surface is drained by the Kishon, which flows west to the Mediterranean at Haifa. The plain is surrounded by the hills of Gilboa and Little Hermon; the isolated Mount Tabor rises on its north-east side. It is extremely fertile in grain where cultivated, and covered with gigantic thistles where neglected. It is richest in the central part, which slopes east to the Jordan—the battle-field where Gideon triumphed, and Saul and Jonathan were overthrown. It is the home of wandering Bedouins, who camp in its fields, and gallop over its green-sward in search of plunder. Many places of deep historical interest are connected with this plain. Shu'em, Nain, Endor, Jezreel, Gilboa, Bethshan, Nazareth, and Tabor are all in its vicinity. The plain of Jericho is a vast level expanse, covered with the richest soil, now quite neglected. Around the site of Jericho, "the city of palm-trees," there is not now a single palm; but a recent experiment proved its capability of producing in abundance all the crops for which it was formerly famous. The climate of P. is very varied; January is the coldest and July the hottest month. The mean annual temperature of the year at Jerusalem is 65° Fahr., resembling that of Madeira, the Bermudas, and California. The extreme heat of the summer months is modified by sea-breezes from the north-west. In the plain of Jericho and the Jordan valley it is extremely hot and relaxing. The *sirocco*, a south-east wind, is oft an oppressive in early summer. Snow falls in the uplands in January and February, and thin ice is often found at Jerusalem, where the annual rainfall is 61 inches. Heavy dews fall in summer and the nights are cold. Violent thunderstorms occur in winter. In the south, Judah and part of Benjamin is a dry parched land; the bare limestone rock is covered here and there with a scanty soil, and the vast remains of terraces shew how assiduously it must have been cultivated in ancient times to support the teeming population indicated by the ruins of cities with which every eminence is crowned. To the north of Judea the country is more open, the plains are wider, the soil richer, and the produce more varied, till at Nablous the running streams and exuberant vegetation recall to the traveller the scenery of the Tyrol. Even in its desolation, P. is a land flowing with milk and honey. There is no evidence of its climate having changed or deteriorated, nor any reason to suppose that it would fail to support as great a population as ever it did, provided the same means as formerly were used for its cultivation. It has the same bright sun and unclouded sky, as well as the early and latter rain, which, however, is diminished in quantity, owing to the destruction of trees.

The botany of P. is rich and varied, resembling that of Asia Minor. Among its trees are the pine, oak, elder, and hawthorn in the northern and higher districts, and the olive, fig, carob, and sycamore elsewhere. The cultivated fruits are the vine, apple, pear, apricot, quince, plum, orange, lime, banana, almond, and prickly pear. Wheat, barley, peas, potatoes, and European vegetables, cotton, millet, rice, maize, and sugar-cane are among its products. The date now ripens its fruit only in the south and on the sea-board. The brilliant flowers which in spring enamel the surface and tinge the entire landscape, comprise the *adonis*, *ranunculus*, *mallow*,

poppy, pink, anemone, and geranium. In the Jordan valley, 900 or 1000 feet below the sea-level, the vegetation is tropical in its character, resembling that of Arabia; the nubk (*Spina Christi*), the oleander, and the small yellow "apples of Sodom" are conspicuous. The most valuable products of the vegetable kingdom are derived from the vine, fig, olive, and mulberry trees. Wine for home use is made in all the central and southern districts; the best is made at Hebron from the grapes of Eschol. Olive oil is a valuable export.

The wild animals of P. comprise the Syrian bear in Lebanon, the panther, jackal, fox, hyena, wolf, wild boar, gazelle, and fallow-deer; the lion is now unknown. The domestic animals are the Arabian camel, ass, mule, horse, buffalo, ox, and broad-tailed sheep. Among the birds are the eagle, vulture, kite, owl, nightingale, jay, and kingfisher—the latter of brilliant plumage—the cuckoo, heron, stork, crow, partridge and sparrow. Fish swarm in the Sea of Galilee, and bats and lizards abound.

The divisions of P. in Old Testament times were into  $9\frac{1}{2}$  tribes in the west, and  $2\frac{1}{2}$  tribes in the east of the Jordan. In New Testament times, on the west of the Jordan, the provinces of Galilee in the north, Samaria in the middle, and Judea in the south; on the east of the Jordan, Perea and Decapolis. The boundaries of the tribes and provinces are very uncertain. Its modern divisions have changed with every new race and dynasty of conquerors. Under Turkish rule, P. is comprised in the vilayet of Syria, and contains the two sub-pashalics of Acre and Jerusalem. The present population is very mixed, comprising Syrians, Mohammedans, Maronites, Druses, Christians, Jews, and Turks. The Jews are all foreigners, almost exclusively inhabiting the four holy cities—Jerusalem, Hebron, Tiberius, and Safed; their whole number was, in 1871, estimated at only 10,000. The country is oppressed by Turkish avarice, and overrun by the predatory Arabs. The Palestine exploration has done good work in the identification of Biblical and classical sites, &c. See SYRIA.

PALESTRINA (the ancient *Præneste*), an episcopal city of the present kingdom of Italy, in the province and 22 miles east-south-east of the city of Rome, occupies a strong position on the south-west slope of a high hill, an offset of the Apennines. Besides several interesting churches, the town contains a castle, once the chief stronghold of the Colonna, to whom the town belonged; and the palace and garden of the Barberini family. The view across the Campagna and toward the Alban Hills is magnificent. Pop. 6000, who manufacture coarse woollen goods.

P. is built almost entirely upon the site and the gigantic substructions of the Temple of Fortune, one of the great edifices of the former city of Præneste. This city was one of the most ancient as well as powerful and important cities of Latium. It covered the hill (2400 feet above sea-level) on the slope of which the modern town stands, and was overlooked by a citadel of great strength. The site of this citadel on the summit of the hill is now occupied by a castle of the middle ages, called *Castel S. Pietro*; but remains of the ancient walls are still visible. We first hear of Præneste as a member of the Latin League; but in 499 B.C. it quitted the confederacy, and joined the cause of the Romans. In 380 B.C., the Prænestines, having rejoined their ancient allies, opened a war with Rome; but were completely routed on the banks of the Allia by T. Quintius Cincinnatus, and beaten back to their own gates. They took a prominent part in the famous Latin War, 340 B.C. Having given shelter to the younger Marius in the year 82 B.C., this city was besieged by the forces of Sulla, and on its being taken all the inhabitants were put to the sword. A military colony was then established in their place, and soon the city began to flourish anew. Its elevated and healthy situation, at no great distance from the capital, made it a favorite place of resort for the Romans during summer. Augustus frequented it; Horace often found this city a pleasant retreat; and here Hadrian built an extensive villa. The Temple of Fortune is described by Cicero as an edifice of great antiquity as well as splendor, and its oracle was much consulted. The town became the stronghold of the family of Colonna in the middle ages; but was given to the Barberini family by Urban VIII.

PALESTRINA, Giovanni Pieringi da, a distinguished musical composer of the 16th century. He derived his surname from the town of Palestrina, in the Roman States, where he was born in 1524. At the age of sixteen he went to Rome and

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studied music under Claude Goudimel, afterwards one of the victims of the St Bartholomew massacre. In 1551 he was made *maestro di capella* of the Julian Chapel, and in 1554 he published a collection of Masses, so highly approved of by Pope Julius III., to whom they were dedicated, that he appointed their author one of the singers of the pontifical chapel. Being a married man, he lost that office on the accession to the pontificate of Paul IV., in whose eyes celibacy was a necessary qualification for its duties. In 1555 he was made choir-master of St Maria Maggiore, and held that position till 1571, when he was restored to his office at St Peter's. In 1563, the council of Trent having undertaken to reform the music of the church, and condemned the profane words and music introduced into masses, some compositions of P. were pointed to as models, and their author was intrusted with the task of remodeling this part of religious worship. He composed three masses on the reformed plan; one of them, known as the Mass of Pope Marcellus (to whose memory it is dedicated), may be considered to have saved music to the church by establishing a type infinitely beyond anything that had preceded it, and, amid all the changes which music has since gone through, continues to attract admiration. During the remaining years of his life, the number and the quality of the works of P. are equally remarkable. His published works consist of 18 books of Masses, 6 books of Motets, 1 book of Lamentations, 1 book of Hymns, 1 book of Offertories, 1 book of Magnificats, 1 book of Litanies, 1 book of Spiritual Madrigals, and 3 books of Madrigals. P. must be considered the first musician who reconciled musical science with musical art, and his works form a most important epoch in the history of music. Equally estimable in private life, and talented as a musician, P. struggled through a life of poverty during eight pontificates; his appointments were meagre, and his publications unremunerative. He died in 1594. A memoir of his life and writings has been written by the Abbé Baini.

**PALESTRO**, a village of Piedmont, 8 miles south-east of Vercelli, famous as the scene of a battle between the Sardinians and Austrians in May 1859. On the 30th of that month the Piedmontese drove the Austrians from this village, and on the 31st defended it with great bravery against an Austrian attack. The Piedmontese in the battle of the 31st were assisted by 8000 French Zouaves, and on that occasion the Austrians lost 2100 men killed and wounded, 950 prisoners, and 6 pieces of cannon. On June 1st the allies entered Novara.

**PALETTE**. See **PAINTING**.

**PALEY**, Dr William, a celebrated English divine, was born at Peterborough in 1743. His father was a Yorkshireman, and not long after P. was born returned to his native parish of Giggleswick, one of the wildest and most sequestered districts in the West Riding, to become master of the grammar-school there. Young P. was brought up among the shrewd, hard-headed peasantry of Yorkshire; and it is probable that he either naturally possessed, or insensibly acquired their moral and mental characteristics. At all events, he soon became conspicuous in the family for his good sense; and when he left to enter Christ's College, Cambridge, as a sizar, in his sixteenth year, his father said: "He has by far the clearest head I ever met with." At Cambridge, P. led for the first two years a gay, idle, and dissipated life, but thereafter became a severe student, and took his bachelor degree in 1763 with highest honors. He then taught for three years in an academy at Greenwich. In 1765 he obtained the first prize for a prose Latin dissertation—the subject being "A Comparison between the Stoic and Epicurean Philosophy with respect to the Influence of each on the Morals of a People," in which he characteristically argued in favor of the latter. Next year he was elected a Fellow and Tutor of Christ's, and also took the degree of M.A. In 1767 he was ordained a priest. His career as a college tutor, which lasted about ten years, was eminently successful; and it appears to have been during this period that he systematised his principles in moral and political philosophy. In 1776, P. married, and was of course obliged to give up his fellowship, but was compensated by a presentation to the livings of Mosgrove and Appleby in Westmoreland and of Dalton in Cumberland. Four years later he was collated to a prebendal stall in the cathedral church of Carlisle, in 1782 he became archdeacon, and in 1785 chancellor of the diocese. The last of these years witnessed the publication of his "Elements of Moral and Political Philosophy." In this work he propounds his ethical theory, which is commonly called utilitarianism,

but is really a mixture of utility and theology. He begins by renouncing the favorite doctrine of the Moral Sense, against which he adduces a series of strong objections. He then takes up the question of the source of obligation, and resolves it into the will of God, enforced by future punishment, admitting candidly that virtue is prudence directed to the next world. The will of God, in so far as it is not rendered explicit by revelation, is to be interpreted by the tendency of actions to promote human happiness; the benevolence of the Deity being supposed. Objection has frequently been taken to the principles on which P. rests his system, but the lucidity and appropriateness of his illustrations are beyond all praise. If his treatise cannot be regarded as a profoundly philosophical work, it is at any rate one of the clearest and most sensible ever written, even by an Englishman; and if it failed to sound the depths of "moral obligation," it at least brushed off into oblivion the shallow and muddy mysticism that had long enveloped the philosophy of politics. P.'s plain sarcastic view of the "divine right of kings," which he puts on a level with the "divine right of constables," gave extreme offence to George III., but was nevertheless much admired by not a few of his majesty's subjects, and is now held by everybody to be beyond question. In 1790 appeared his most original and valuable work—the "Norm Pauline, or the Truth of the Scripture History of St Paul evinced by a Comparison of the Epistles which bear his Name with the Acts of the Apostles, and with one another." The aim of this admirable work is to prove, by a great variety of "undesignated coincidences," the improbability, if not impossibility, of the usual infidel hypothesis of his time—viz., that the New Testament is a "cunningly-devised fable." It was dedicated to his friend John Law, then Bishop of Killala in Ireland, to whose favor he had been indebted for most of his preferments. P.'s next important work was entitled "A View of the Evidences of Christianity," published in 1794. It is not equal in originality to its predecessor, but the use which the author has made of the labors of such eminent scholars as Lardner and Bishop Douglas is generally reckoned most dexterous and effective. Later and keener criticism is indeed anything but satisfied with P.'s "Evidences;" but in P.'s own day he was held to have achieved a splendid triumph over sceptics, and was handsomely rewarded. The Bishop of London appointed him a prebend of St Pancras; shortly after he was promoted to the subdeanery of Lincoln (worth £700 per annum); Cambridge conferred on him the degree of D.D.; and the Bishop of Durham the rich rectory of Bishop Wearmouth (worth £1200 per annum), in consequence of which he honorably resigned his livings in the diocese of Carlisle. After 1800 he became subject to a painful disease of the kidneys, but notwithstanding he continued to write, and in 1802 published perhaps the most widely popular of all his works, "Natural Theology, or Evidences of the Existence and Attributes of the Deity," which, however, is based, and to a large extent borrowed from the "Religious Philosopher," the work of a Dutch philosopher named Nieuweuyt, an English translation of which appeared in 1718—1719. The plagiarisms are most palpable, but have been accounted for on the supposition that the "Natural Theology" was "made up" from his loose papers and notes written when P. was a college tutor, and that he had forgotten the sources from which he derived them. It is also but fair to state that he has taken nothing which he has not greatly improved; *nihil teligit, quod non ornarit*. A somewhat noted edition of this work, enriched, or at least expanded by annotations and dissertations, is that by Lord Brougham and Sir Charles Bell (1836—1839). P. died May 25, 1806. He had a family of four sons and three daughters. A complete edition of his works was published in 1838 by one of his sons, the Rev. Edmund Paley. The best biography is that by Meadley (1809).

PALGRAVE, Sir Francis, a distinguished antiquary and historian, was born in London in July 1788, of Jewish parentage, being the son of Mr Meyer Cohen, a member of the Stock Exchange. He was educated at home under a Dr Montucel, and even when a child showed extraordinary genius. When only eight years old, he made a translation into French of the "Battle of the Frogs and Mice" from the Latin version of Beauclerc, which was printed by his father in 1797. In 1808 he was articled as a clerk to a legal firm, and at the expiration of his articles, continued with the same firm as managing clerk until 1822, when he took chambers in the Temple, and was employed under the Record Commission. He had previously made himself known as a literary antiquarian, by the publication, in 1818, of some Anglo-Norman

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Chansons, which he edited with much care. On the occasion of his marriage in 1823, he changed his name of Cohen to P., that being the maiden name of his wife's mother. He was called to the bar in 1827, and had considerable practice for some years in pedigree cases before the House of Lords. In 1831 he published a "History of England," which formed a part of the "Family Library;" and in 1833 appeared his "Rise and Progress of the English Commonwealth;" also "Observations on the Principles, &c., of New Municipal Corporations." In that year he received the honor of knighthood, and was subsequently one of the Municipal Corporation Commissioners. In 1835, the Commissioners issued their Report, which was signed, however, by only sixteen of the members—Sir F. P. being one of the four dissentients. In the same year he published a "Protest" against the Commissioners' Report, in which he called in question several of its statements, views, and arguments. In 1838, on the reconstruction of the Record Service, Sir F. P. was appointed deputy-keeper of Her Majesty's Records, and held that office during the rest of his life. Besides the works already mentioned, Sir F. P. edited for the government the following: "Calendars of the Treasury of the Exchequer," "Parliamentary Writs," "Curia Regis Records," and "Documents Illustrative of the History of Scotland." In his private capacity, he produced the "Merchant and the Friar," an imaginary history of Marco Polo and Friar Bacon; also a "Hand-book for Travellers in Northern Italy," and a "History of England and Normandy." Of this last work a volume appeared in 1861, and a second in 1867; and the third and fourth volumes were published within three years after their author's death. Sir F. P. also wrote numerous articles for the "Edinburgh" and "Quarterly Reviews," principally of an antiquarian character, but some of them purely literary or artistic. His great merit, in his historic writings, consists in the extensive use made by him of original documents, by aid of which he not only himself very much enlarged our acquaintance with the history and social aspects of the middle ages, but pointed out to others the advantage to be derived from a careful study of the original sources of information now known to abound among our public records. Sir F. P. died at Hampstead, on the 6th of July 1861.

**PĀLI** (a corruption of the Sanscrit *Prākṛit*, q. v.) is the name of the sacred language of the Buddhists. Its origin must be sought for in one or several of the popular dialects of ancient India, which are comprised under the general name of *Prākṛit*, and stand in a similar relation to Sanscrit as the Romance languages, in their earlier period, to Latin. It has been formerly assumed that P. arose from the special *Prākṛit* dialect called *Māgadhi*, or the language spoken in *Magadha*; but, according to the view expressed by Lassen in his "Indische Alterthumskunde," an hypothesis of this kind is not tenable, since the peculiarities of this dialect are not compatible with those of the P. language. The same distinguished scholar holds that the *Prākṛit* dialects, called the *Sauraseni* and *Māhārāshṭri*, have a closer relation to the P. than any other, and that the origin of the latter must therefore be traced to the country of Western Hindustan, between the Jumna river and the Vindhya mountain; though he observes, at the same time, that the P. is older than these dialects, and that the latter are therefore more remote from Sanscrit than the former. Whether the oldest works of the Buddhist religion were written in P. may be matter of doubt. It is more probable, on the contrary, that the language in which the founder of the Buddhist religion conveyed his doctrine to the people was not yet that special language, but a mixture of classical and popular Sanscrit, such as it still appears in the Buddhistic *Sūtras*. At a later period, however, P. became the classical language in which the Buddhists wrote their sacred, metaphysical, and profane works. The most important historical work written in this language is the "*Mahāvamsa*" (q. v.); other P. works, which have lately become known in Europe, and deserve especial mention, are the "*Dhammapada*," on the Buddhist doctrine, and five "*Jātakas*," containing a fairy tale, a comical story, and three fables—both works edited and translated by V. Fausbøll (Copen. 1855 and 1861). P. ceased to be a living language of India when Buddhism was rooted out of it; it was carried by the fugitive Buddhists to other countries, especially Ceylon, Burmah, and Siam; but in these countries, too, it had to give way before the native tongues, in which the later Buddhist literature was composed.

**PA'LIMPSEST** (Gr. *palimpsestos*, "rubbed a second time"), the name given to

parchment, papyrus, or other writing material, from which, after it had been written upon, the first writing was wholly or in part removed for the purpose of the page being written upon a second time. When the MS. had been written with one species of ink employed by the ancients, which was merely a fatty pigment composed chiefly of lampblack, and only coloring the surface, but not producing a chemical change, there was little difficulty in obliterating the writing. It was accomplished by the use of a sponge, and, if necessary, of a scraper and polishing tool; and, where proper pains were taken, the erasure of the first writing was complete. But when the ink was mineral, its effect reached beyond the surface. In that case a scraping-tool or pumice-stone was indispensable; if these were hastily or insufficiently applied, the erasure was necessarily imperfect; and thus it often happens in ancient MSS. that, from the want of proper care on the part of the copyist in preparing the parchment for re-writing, the original writing may still be read without the slightest difficulty.

The practice of re-preparing used parchment for second use existed among the Romans. The material thus re-prepared was of course reserved for the meaner uses. We meet frequent allusions in the classical writers, as Plutarch, Cicero ("Ad Familiāres," vii. 18), Catullus (xviii. 115), and others, to the palimpsest, in the sense of a blotter or first draft-book, on which the rough outline or first copy of a document was written, preparatory to the accurate transcript which was intended for actual use; and it appears equally certain that in many cases whole books were written upon re-prepared parchment or papyrus, not only among the Greeks and Romans, but also among the ancient Egyptians.

Of palimpsests of the classic period, however, it is hardly necessary to say no specimen has ever been discovered. It is to the necessities of the medieval period that literature owes the unquestionably important advantages which have arisen from the revival of the ancient practice of re-preparing already used material for writing. Under the early emperors, the intercourse with Egypt and the east secured a tolerably cheap and abundant supply of Papyrus (q. v.), which rendered it unnecessary to recur to the expedient of the palimpsest; and this became still more the case in the 5th and 6th centuries, when the tax on papyrus was abolished. But after the separation of east and west, and still more after the Mohammedan conquest of Egypt, the supply of papyrus almost completely ceased; and from the 7th c. in the west, and the 10th or 11th in the east, the palimpsest is found in comparatively frequent use; and its frequency in the 15th c. may be estimated from the fact that some of the earliest books were printed on palimpsest. Some writers have ascribed the prevalence of its use to the indifference, and even to the hostility of the monks and clergy to classical literature, and have attributed to their reckless destruction of classic MSS., in order to provide material for their own service-books and legends, the deficiencies in the remains of ancient learning which scholars have now to deplore. That some part of the loss may have so arisen, it is impossible to doubt, although it is equally certain that we owe to the medieval monks and clergy whatever of ancient literature has been preserved to our day. But the condition in which the existing palimpsests are uniformly found—for the most part mere fragments of the ancient writers whose works they originally contained—goes far in itself to shew that the MSS. which were broken up by the medieval copyists, for the purpose of being re-written, were almost always already imperfect, or otherwise damaged; nor is there anything in the condition of any single palimpsest which has reached our day to justify the belief, that when it was taken up for the purpose of rescription, the original work which it contained was in a state at all approaching to completeness. Fortunately, however, there are many of the relics of ancient learning of which even the mutilated members have an independent value; and this is especially true of Biblical MSS., particularly under the critical aspect, and in a still broader sense, of all the remains of the ancient historians.

It will easily be understood, therefore, that the chief, if not the sole interest of palimpsest MSS. lies in the ancient writing which they had contained, and that their value to literature mainly depends on the degree of legibility which the ancient writing still retains. It is difficult to make this fully intelligible to the reader without an actual inspection. As very commonly occurs, the original writing is much larger than the modern; the modern lines and letters do not cover those of the old MS., but they follow the same order. In other specimens the new writing



is transverse; in some, the old page is turned upside down. Sometimes, where the old page is divided into columns, the new writing is carried over them all in a single line; sometimes the old page is doubled, so as to form two pages in the new MS. Sometimes it is cut into two, or even three pages. The most perplexing case of all for the decipherer is that in which the new letters are of the same size, and are written upon the same lines with those of the original MS. Examples of this are rare, and even when they occur, the difference between the form of the ancient characters, which are ordinarily uncial, and that of the modern, is in itself a great aid to the decipherer. Some variety, also, is found in the language of the palimpsests. In those which are found in the western libraries, the new writing is almost invariably Latin, while the original is sometimes Greek, and sometimes Latin. In the palimpsests discovered in the east, the original is commonly Greek, the new writing being sometimes Greek, sometimes Syriac, sometimes Armenian; and one palimpsest, the material of which is papyrus, is found in which the original was the enchorial Egyptian language, while the modern writing is Greek.

The possibility of turning palimpsest MSS. to account as a means of extending our store of ancient literature, was suggested as far back as the days of Montfaucon; but the idea was not turned to practical account till the latter part of the 18th century. The first palimpsest editor was a German scholar, Dr Paul Bruns, who having discovered that one of the Vatican MSS. was a palimpsest, the effaced matter of which was a fragment of the 91st book of Livy's "Roman History," printed it at Hamburg in 1778. In the field of discovery thus opened by Bruns but little progress was made until the following c., when Dr Barrett of Trinity College, Dublin, published his palimpsest Fragments of St Matthew, and when palimpsest literature at once rose into interest and importance in the hands of the celebrated Angelo Mai (q. v.). A detailed account of Mai's successes will be given hereafter, when we shall enumerate the principal publications in this curious department of letters; and under his own name will be found the history of his personal labors. The great historian Niebuhr about the same time applied himself to the subject, and was followed by Blume, Pertz, Guupp, and other German scholars, whose labors, however, were for the most part confined to the department of ancient Roman law. More recently, the discoveries of Dr Tischendorf in Biblical literature, and those of Dr Cureton as well in sacred as in profane literature, have contributed still more to add importance to the palimpsest MSS. which have been supposed to exist in the monasteries of the Levant. Herr Mone has had similar success in the department of liturgical literature, and Dr Frederick Augustus Pertz, son of the scholar already mentioned, may be said to have carried to its highest point the interest which attaches to these curious researches, by editing from a *thrice written palimpsest* a very considerable series of fragments of the Roman annalist, Gaius Gracilius Licinianus.

It remains to enumerate briefly the most important palimpsest publications which have hitherto appeared, distributed according to the language of the effaced original.

**I. GREEK PALIMPESTS.**—Among these, the first place of course belongs to the Greek Biblical palimpsests, the earliest of which was (1) "Fragments of the Gospel of St Matthew," in facsimile as well as in *ordinary* type, painted from a palimpsest MS. of Trinity College, Dublin, by the Rev I. Barrett, D.D. (4to, Dublin, 1801). The original writing appears to be of the 6th century. Dr Barrett's transcript of the text has not proved in all respects correct, but the original has since been carefully re-examined, and the ancient writing fully brought out. It is chiefly, however, to a collection of Syriac MSS. brought from the east that we are indebted for the more recent palimpsest restorations of the ancient Biblical readings. In this line the chief discoverer has been Dr Constantine Tischendorf. From his pen we have (2) the celebrated "Codex Ephremi" or "Codex Regius" of the Royal Library at Paris. This MS. had been early observed to be palimpsest, and the original Greek text was collated in part by Wetstein and by Küster. It was still more carefully examined by M. Hase in 1835; and finally, in 1840, by Dr Tischendorf, by whom the New Testament was printed in 1843, and the fragments of the Old in 1845. The modern writing of this palimpsest consisted of the works of St Ephrem the Syrian. (3) "Fragmenta Sacra Palimpsesta" (4to, Leipsic, 1855), containing fragments of the Books of Numbers, Deuteronomy, Joshua, Judges, Kings, Isaiah, together with 48 pages of fragments of the New Testament, the Gospels, the Acts, and the Epistles

of St Paul to the Corinthians and to Titus. The modern writing of these palimpsests was partly Greek, partly Armenian and Arabic. (4.) "Fragmenta Evangelii Lucae et Libri Genesis (4to, Leipzig, 1867). The fragments of St Luke's Gospel amount to 95 pages. The volume also contains fragments of St John's Gospel and of Ezekiel and the Third Book of Kings. The modern writing is partly Syriac, partly Coptic. Along with these Biblical palimpsests (5) may be classed another, the original of which, however, contains not only some Greek fragments, but also portions of the ancient Gothic version of the Bible by Uphilas. The MS. from which this is taken is known from its place in the Wolfenbüttel Library as the "Codex Guelpherbytanus." It was first noticed in 1755 by Knittel, by whom a portion of the Gothic version was published in 1762. These fragments were reprinted in 1772, and again in 1803. The modern writing of the MS. consisted of the "Origines" of Isidorus Hispalensis. A large addition to the text of Uphilas was made in 1817 by Mai and Castiglione, from palimpsests discovered in the Ambrosian Library at Milan; and the whole have since been combined into one edition by Dr Gabelentz, and finally by Dr Massmann (4to, Stuttgart, 1855). We may also mention under the same head some interesting Greek liturgical remains edited by F. I. Mone (Frankfort, 1850), from a palimpsest discovered at Carlsruhe.

In Greek classical literature, also, we owe something to the labors of palimpsest editors. From one of the Syriac MSS. already referred to, Dr Cureton has edited large fragments of the "Iliad" of Homer, amounting in all to nearly 4000 lines; and although all these, it need hardly be said, were known before, yet the text is of the utmost value as a source of criticism, being certainly of much greater antiquity than the very earliest known MSS. of the "Iliad." A still larger and more original contribution to Greek classical literature was made by Mai in the fifth volume of his "Scriptorum Veterum Nova Collectio" (Rome, 1831—1838). From a very large palimpsest discovered in the Vatican Library he has printed in this volume copious fragments of almost all the Greek writers on Roman history—from the lost books of Polybius no less than 100 4to pages; 130 pages of Diodorus Siculus; 64 of Dionysius of Halicarnassus; 100 of Dion Cassius; together with considerable fragments of Appian, Iamblichus, Dexippus, Eunapius, and others. This is, perhaps, after the "De Republica" of Cicero, the most important accession to the existing store of classic learning which the palimpsests have hitherto supplied.

II. LATIN PALIMPESTS.—(1.) The earliest fragment of Latin literature, printed from a palimpsest original, is the portion of the 91st book of "Livy" already referred to, published at Hamburg and also at Rome in 1773. It was re-edited in a more complete form by Niebuhr in 1820. (2.) Of the Latin palimpsests edited by Mai, the earliest were some fragments of lost Orations of Cicero from two different palimpsests in the Ambrosian Library at Milan, in the latter of which, the second writing consisted of the acts of the council of Chalcedon. These Orations were published in two successive volumes in 1814. (3.) Eight Orations of Symmachus (1815). (4.) The Comedies of Plautus, including a fragment of the lost play entitled "Vidularia" (1815). (5.) The works of M. Corn. Fronto, together with the *Epistles* of Antoninus Pius, Lucius Verus, M. Aurelius, and others (1815). (6.) The celebrated Dialogue of Cicero, "De Republica," from a palimpsest of the Vatican, the modern writing of which is the commentary of St Augustine on the Psalms. There is none of Mai's publications which presents his critical abilities in so favorable a light as this precious volume, which appeared at Rome in 1821. (7.) Soon after the "De Republica" he published another volume from palimpsest sources, the most important of whose contents were some fragments of ancient Roman law, which prepared the way for the more distinguished success of Niebuhr; who, in a palimpsest of the library of Verona, recognised a portion of (8) the "Institutiones" of Gaius, and procured an accurate transcript for the press, which was printed at Berlin in 1820. The latest considerable Latin publication in this department is (9) "Gaii Granii Liciniani Annalium quæ supersunt" (Berlin, 1867), edited from a palimpsest of the British Museum by the younger Pertz. This palimpsest, as was already stated, is a thrice written codex, the earliest and original contents being the "Annales" of Gaius Granianus. The second writing was also in Latin, and the work is a grammatical treatise, of which the chapters "De Verbo" and "De Adverbio" are still legible. The most modern writing is Syriac, written in the cursive character. Gaius Granianus is a writer named by Macrobius, of whom nothing else is known.

It will be gathered from the above that the ancient works recovered by means of palimpsest MSS. are all fragmentary, and one is naturally led to rate at a low value the result thereby obtained. But it must be remembered that in some of the departments to which these fragments belong, every scrap, no matter how trifling, has an independent value. So it is, for example, in Biblical remains—a single text may present a valuable reading, the merest fragment may throw light on an important critical question. In history, in like manner, a small fragment may disclose an interesting fact, or supply a significant commentary upon facts otherwise ascertained. And as regards critical uses especially, it must not be forgotten that the obliterated text of the palimpsest MSS., for the most part, far exceeds in antiquity the very oldest known codices which we possess, and is, probably, second only in age to the papyri of Herculaneum.

The method of treating palimpsest MSS., with a view to deciphering their contents, has been fully described by different editors. Mai, after having washed the palimpsest with an infusion of galls, exposed it to the light and air, and, generally speaking, found this sufficient for his purpose. Peyron washed the parchment in water, afterwards in dilute muriatic acid, and finally in prussiate of potash. A mixture, compounded on this principle, is called from its inventor, M. Gioberti, *Tinctura Giobertina*. Sometimes the same treatment does not succeed equally well on both sides of the parchment; the inner surface, from its softer texture, sometimes requiring a more active preparation. When the ink contained animal substances, as milk, or the blood of the cuttle-fish, Dr Mone plunged the parchment in a close vessel filled with oil, which he heated to a temperature of 406° R. In the prefaces of Mai's volumes will be found many amusing and interesting facts illustrating the difficulties which attend this curious branch of literary labor.

PA'LINDROME (Gr. *palin*, backwards, and *dromos*, a running), the name given to a kind of verse very common in Latin, the peculiarity of which is that it may be read the same backwards as forwards. A few examples will suffice.

*Si bene te tua laus tazat sua laus tenebris.  
Et necat eger amor non Roma rege tacente,  
Roma reges una non anus eger amor.*

A Roman lawyer gets the credit of the following :

*Si nuamini immunis,*

which Camden translates :

"Give me my fee, and I warrant you free."

It is said that in the reign of Queen Elizabeth a certain lady of rank, having been compelled to retire from the court on account of some *fama*, the truth of which she denied, took for her motto :

*Ablata at alba.  
"Retired but pure."*

The English language has few palindromes, but one at least is inimitable. It represents our first parent politely introducing himself to Eve in these words :

"Madam, I'm Adam."

Compare Henry B. Wheatley's book on "Anagrams" (1662).

PALINGENE'SIA (Gr. *palin*, again, and *genesis*, birth) is a term that appears to have originated among the Stoics, who employed it to denote the act of the Demi-urgus, or Creator, by which, having absorbed all being into himself, he reproduced it in a new creation. The occurrence of the word in the New Testament (Titus, iii. 5, where it is used to denote regeneration) has given it a place in Christian theology, and divines have variously used it to express the resurrection of men, the new birth of the individual soul, and the restoration of the world to that perfect state that it lost by the Fall—"the new heavens and the new earth wherein dwelleth righteousness." Savans have also applied the term to designate both the great geological changes which the earth has undergone and the transformations in the insect kingdom, such as of caterpillars into butterflies, &c.

**PALINODE**, in the law of Scotland, is a peculiar practice by which, in actions for damages on account of slander or defamation raised in the Commissary Court, and even in the Sheriff Court, the pursuer may conclude not only for damages but for palinode, i. e., a solemn recantation. On a recent case, the question arose whether this ancient practice still existed as part of the law of Scotland, and it was held that it did. In actions, however, in the Court of Session, damages only are given as the remedy.

**PA'LI SADE**, a piling of strong timber, used in Fortification. For the mode in which the palisado is employed see **FORTIFICATION** under the head *Stockade*.

**PALISANDER WOOD**, the continental name for Rosewood (q. v.). By some of the French cabinet-makers the name *bois de Palisandre* is also applied to violet wood and to a kind of striped ebony.

**PALISSY**, Bernard, a French potter, famous for his glass paintings and beautiful figured pottery, was born near Agen, now in the department of Lot et Garonne, France, about 1510, and at an early age was apprenticed to a potter. He devoted himself to chemical researches for the improvement of his art, and made many journeys through France and Germany for the same purpose; at the same time carrying on the business of a land-surveyor. An enamelled cup of "Falcon," which he saw by chance, inspired him with the resolution to discover the mode of producing white enamel. Neglecting all other labors, he devoted himself to investigations and experiments for the long period of 18 years. He had by this time exhausted all his resources, and for want of money to buy fuel was reduced to the necessity of burning his household furniture piece by piece; his neighbors laughed at him, his wife overwhelmed him with reproaches, and his starving family surrounded him crying for food; but in spite of all these discouragements he persisted in the search, and was in the end rewarded by success. A few vessels adorned with figures of animals, colored to represent nature, sold for high prices, and enabled him to complete his investigations, after which he became famous; and though a Huguenot, was protected and encouraged by the king and the nobility, who employed him to embellish their mansions with specimens of his art. He was lodged in or near the Tuilleries, and was specially exempted by Queen Catharine from the massacre of St Bartholomew, more from a regard to her own benefit than from kindness. In March 1575 he commenced a course of lectures on natural history and physics, and was the first in France to substitute positive facts and rigorous demonstrations for the fanciful interpretations of philosophers. In the course of these lectures, he gave (1584) the first right notions of the origin of springs, and the formation of stones and fossil shells, and strongly advocated the importance of manure as a fertilizing agent. These, along with his theories regarding the best means of purifying water, have been fully supported by recent discovery and investigation. In 1588 he was arrested and thrown into the Bastille as a heretic, but died in 1590 before his sentence was pronounced.

P. left a collection of objects of natural history, the first that had been formed in France. His works are at the present day almost beyond price, and his ornaments and arabesques are amongst the most beautiful of the "renaissance." As a sincere, earnest, and courageous man, he was no less eminent than as an artist.

**PALURUS**, a genus of trees and shrubs of the natural order *Rhamnaceæ*, nearly allied to *Zizyphus* (see *JURJAN*), but very different in the fruit, which is dry, orbicular, and girded with a broad membranous wing. *P. aculeatus* is often called **CHRIST'S THORN**, and by the Germans, **JEW'S THORN** (*Judenborn*), from an imagination that it supplied the crown of thorns with which our Saviour was crowned. It is a deciduous shrub or low tree, with slender, piliant branches and ovate 3-nerved leaves, each of which has two sharp spines at the base, one straight and the other re-curved. It is a native of the countries around the Mediterranean, of India, and many parts of Asia. It is often used for hedges in Italy and other countries; its sharp spines and piliant branches admirably adapting it for this purpose. The fruit has a singular appearance, being flat and thin, attached by the middle to the foot-stalk, the middle being raised like the crown of a hat, whilst the expansion resembles the brim. The seeds are sold by the druggists of the east, and are used medicinally, but their qualities are doubtful. This shrub is not uncommon in shrubberies in England, being very ornamental when in flower, but the fruit does not ripen.

Palk  
Pallas

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**PALK STRAIT**, or **Palk's Passage**, the northern portion of the passage between the south coast of Hindustan and the island of Ceylon. This passage is continued southward by the Gulf of Manaar (q. v.). It is from 40 to 80 miles in width, and is 80 miles in length. It is so shallow—in some places being no more than two fathoms in depth—that it cannot be navigated in safety by large vessels. In P. S. there are several pearl fisheries.

**PALL** (Lat. *pallium*, also *palla*, a cloak), the name given in English to two very different portions of the vesture employed in the religious use of the Roman and some other churches. One of these is the *funeral pall*, an ample covering of black velvet or other stuff, which is cast over the coffin while being borne to burial. The ends of the pall are held during the funeral procession by the most distinguished among the friends of the deceased, generally selected from among those unconnected by blood. In its second and most strictly liturgical use, the word pall is applied to one of the coverings used at the altar in the celebration of the mass. Primitively, as appears from Optatus and other early writers, the altar was covered with a large linen cloth—called by the Latins *pallium*, and by the Greeks *eliton*—the extremities of which were folded back so as to cover the bread and wine prepared for the celebration of the eucharist. In later times a separate covering was employed for the sacramental chalice, to which latter the name pall is now reserved in the use of the Roman Church. The modern Roman pall is a square piece of linen cloth—sometimes limer, sometimes made stiff by inserting pasteboard—sufficiently large to cover the mouth of the chalice. The upper surface is often of silk embroidered, or of cloth of gold. The surface in contact with the chalice must always be of linen.

**PALL**, in Heraldry, the upper part of a saltire conjoined to the lower part of a pale. It appears much in the arms of ecclesiastical sees.

**PALL-MALL**. See **MALL**.

**PALLADIO**, Andrea, a famous Italian architect, was born at Vicenza, 20th November 1518. After having studied with the greatest care the writings of Vitruvius, and the monuments of antiquity at Rome, he settled in his native city, and first acquired a reputation by his restoration of the Basilica of Vicenza. Pope Paul III. then invited him to Rome, designing to intrust him with the execution of the works then going on at St Peter's, but his holiness dying before the arrival of P., the latter had to return home. He was employed for many years in the construction of numerous buildings in Vicenza and the neighborhood, in all of which he displayed the most exquisite taste combined with the most ingenious and imaginative ornamentation. His style, known as the Palladian, is a composite, and is characterised by great splendor of execution and justness of proportion, and it exercised an immense influence on the architecture of Northern Italy. His principal works are the Rotonda Capra, outside Vicenza; the Palazzo Chiericato and the Palazzo Tiene, in the city; the Palazzo Barbara, at Maser in the Trevigiano, the Teatro Olympico at Vicenza (his last work), the Palazzo at Montagnana for Francesco Pisana; the churches of San Giorgio Maggiore and Il Santissimo Redemptore at Venice, the atrium and cloister at the convent Della Carità, and the facade of San Francesco della Vigna in the same city. P. died at Vicenza, August 6, 1580. He wrote a work on architecture, which is highly prized. The best edition is that published at Vicenza in 4 vols., 1776.

**PALLADIUM** (symb. Pd., eq. 52—new system, 106—spe. grav. 11.6) is one of the so-called noble metals, which in its color and ductility closely resembles platinum. It is not fusible in an ordinary wind-furnace, but melts at a somewhat lower temperature than the last-named metal; and when heated beyond its fusing-point, it volatilises in the form of a green vapor. It undergoes no change in the open air at ordinary temperatures; but at a low red heat, it becomes covered with a purple film, owing to superficial oxidation. It is soluble in nitric and iodic acids, and in aqua regia. It combines readily with gold, which it has the property of rendering brittle and white. (When it forms 90 per cent. of the mass, the alloy is perfectly white.) When alloyed with twice its weight of silver, it forms a ductile compound, which has been employed for the construction of small weights; but for this purpose aluminium is superior. Professor Miller states that it "has been applied in a few cases to

the construction of graduated scales for astronomical instruments, for which, by its whiteness, hardness, and unalterability in the air, it is well adapted;" its scarcity must, however, prevent its general use for this purpose.

It was discovered in 1803 by Wollaston in the ore of platinum, of which it seldom forms so much as 1 per cent. Another source of this metal is the native alloy which it forms with gold in certain mines in Brazil, and which is termed *ouro poudre*; and it is from this alloy that the metal is chiefly obtained.

Palladium forms with oxygen a protoxide,  $PdO$ , which is the base of the salts of the metal; a binoxide,  $PdO_2$ ; and according to some chemists, a suboxide,  $Pd_2O$ . On exposure to sufficient heat, these compounds give off their oxygen, and yield the metal. The salts of the protoxide are of a brown or red color.

PALLADIUM, among the ancient Greeks and Romans, an image of Pallas, who was generally identified with Athene, upon the careful keeping of which in a sanctuary the public welfare was believed to depend. The Palladium of Troy is particularly celebrated. According to the current myth, it was thrown down from heaven by Zeus, and fell on the plain of Troy, where it was picked up by Ilus, the founder of that city, as a favorable omen. In the course of time, the belief spread that the loss of it would be followed by the fall of the city; it was therefore stolen by Odysseus and Diomedes. Several cities afterwards boasted of possessing it, particularly Argos and Athens. Other accounts, however, affirm that it was not stolen by the Greek chiefs, but carried to Italy by Aeneas; and the Romans said that it was preserved in the temple of Vesta, but so secretly, that even the Pontifex Maximus might not behold it. All images of this name were somewhat coarsely hewn out of wood.

PALLADIUS, Rutilius Taurus Aemilianus, a Roman author, who probably lived in the 4th c. A.D., under Valentinian and Theodosius. He wrote a work, "De Re Rustica" (On Agriculture), in 14 books, the last of which is a poem of 85 elegiac couplets. It is, from a literary and grammatical point of view, full of faults; but as it was a complete calendar of Roman agriculture, it was very useful for its time, and was much read and followed during the middle ages. P. has borrowed largely from his predecessors. The best edition is that by J. G. Schneider in his "Scriptores Rei Rusticæ Veteris Latini" (4 vols., Leip. 1794).

PALLAS. See MINERVA.

PALLAS, Peter Simon, an eminent traveller and naturalist, was born, 22d September, 1741, at Berlin, where his father was a physician. He studied medicine, natural history, and other branches of science, at the universities of Berlin, Göttingen, and Leyden, and was employed in classifying many valuable collections of objects of natural history, both in Holland and England. He gained a high reputation by the publication of his "Eleuchus Zoophytorum" (Hague, 1766), a work still much valued; "Miscellanea Zoologica" (Hague, 1766), and "Spicilegia Zoologica" (3 vols., Berlin, 1767—1804). The Empress Catharine invited him, in 1768, to St. Petersburg, where he was well received, and had honors conferred on him, and he was subsequently appointed naturalist to a scientific expedition bound for Siberia, there to observe the transit of Venus. P. spent six years on this journey (1768—1774), exploring in succession the Ural Mountains, the Kirghis Steppes, great part of the Altian range, and the country around Lake Baikal as far as Kincta, great part of Siberia, and the steppes of the Volga, returning to St. Petersburg in 1774, with an extraordinary treasure of specimens in natural history, which form the nucleus of the Museum of the Academy of St. Petersburg. His travels ("Reisen durch verschiedene Provinzen des Russ. Reichs") were published at St. Petersburg (1771—1776), in three volumes, and were followed by his "Sammlung historischer Nachrichten über die Mongol. Völkerschaften" (3 vols., St. Petersburg, 1776—1802), and his "Neue nordische Beiträge zur physikalischen und geographischen Erd- und Völkerbeschreibung, Naturgeschichte und Oekonomie" (6 vols., St. Petersburg, 1781—1793). Without positively neglecting any branch of natural history, he now devoted himself more particularly to botany; and his magnificent "Flora Rossica" (St. Petersburg, 1784—1793), a work which, however, he was not able to complete, and his "Species Astragalorum" (14 parts, Leip. 1800—1804), were among the results of his studies. He published also "Icones Insectorum præcipue Rossicæ Sibiricæque Peculiarium" (Erlangen, 1781, 1783, and 1806); and contributed to a glossary of all the languages of the Russian empire, which was published at St.

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Petersburg. As he wished to live in the Crimea, the Empress Catharine presented him with an estate in the finest part of that peninsula, where he resided generally from 1796. His "Travels in the South of Russia" were published in 1799 (3 vols., Leipz., with volume of plates). After the death of his wife, he went to Berlin, where he died, 8th September 1811. A large and valuable work of his, on the Fauna of Russia, has not yet been published.

PALLAVICINO, Pietro Sforza, an Italian historian, son of the Marquis Alessandro Pallavicino of Parma, was born at Rome, 30th November 1607. Much to the disgust of his father, he took priest's orders, and held several important ecclesiastical appointments during the pontificate of Urban VIII. In 1637, he became a member of the Jesuit Society, and was created a cardinal in 1657 by Pope Alexander VII. He died at Rome, 5th June 1667. P. was a fine scholar, and often presided in the famous Roman academy of the *Umoristi*. The best known of all his writings is his "Istoria del Concilio de Trento" (Rome, 1656—1657), intended as a reply to the still more celebrated and liberal, although, by Catholics, deeply suspected, work of Paul Sarpi. Among his other works may be mentioned "Vindicationes Soc. Jesu" (Rome, 1649); "Arte della Perfezione Cristiana—I Fasti Sacri" (the unpublished MS. is in the library of Parma); "Ermengilda," a tragedy (Rome, 1644); "Gli Avvertimenti Grammaticali" (Rome, 1661); "Trattato dello Stilo e del Dialogo" (Rome, 1662); and "Lettere" (Rome, 1668).

PA'LLI, a town of Rajputana, in Judpore, stands on the right bank of a branch of the Luni River, in lat. 25° 48' n., long. 73° 24' e. It is an entrepôt for the opium sent from Malwa to Bombay, and is the seat of extensive commerce. It imports European manufactured goods extensively, and is estimated to contain about 50,000 inhabitants.

PALLIOBRANCHIATA. See BRANCHIOPODA.

PALLIUM, the name given in the Roman Catholic Church to one of the ecclesiastical ornaments worn by the pope, by patriarchs, and by archbishops. Its use is held by Roman Catholics to descend from a very early period. It is worn by the pope at all times, as a symbol of his reputed universal and abiding jurisdiction. By archbishops it cannot be worn until it has been solemnly asked for and granted by the pope, and even then only during the solemn service of the great church festivals, and on occasions of the ordination of bishops, or of priests, and other similar acts of the archiepiscopal order. The pallium is a narrow annular band of white woollen web, about three inches wide, upon which black crosses are embroidered, which encircle the neck of the archbishop, and from which two narrow bands of the same material depend, one falling over the breast, the other over the back of the wearer. Its material is the subject of much care and ceremonial. It is made wholly or in part from the wool of two lambs, which are blessed annually on the festival, and in the church of St Agnes. During the night of the vigil of the feast of St Peter and St Paul, the *pallia* made of this wool are placed on the altar above the tomb of these apostles, and on the feast of St Peter and St Paul are delivered by the pope to the subdeacon, whose duty it is to keep them in charge. Within three months of his consecration, every new archbishop is obliged to apply to the pope, in person or by proxy, for the pallium; nor is it lawful for him, until he shall have received it, to exercise any act of what is properly archiepiscopal, as contradistinguished from episcopal jurisdiction. Thus, he cannot, for example, call a *provincial* synod. The pallium cannot be transferred from one archbishop to another, but must be received direct from the pope. On the archbishop's death, his pallium is interred with him. Its use is held to symbolise the office of the "good shepherd," bearing the lost sheep on his shoulders, and is connected by some writers with the vesture of the Jewish high-priest in Exod. xxviii. 4. In the medieval church, the granting of the pallium to archbishops was one of the chief occasions of the tribute which was paid by the national churches to the support of the great central office and dignity of the papacy. In some sees, as, for instance, those of the great prince-bishops of the Rhine, the tribute was as much as 20,000 florins. Roman Catholics, however, maintain that this tribute was not a *payment* for the pallium, but an *offering* to the holy see, made on occasion of the grant of that emblem of jurisdiction.

END OF VOLUME EIGHT.

















